SONY

PORTABLE VIDEOCASSETTE RECORDER

PVV-3
PVV-3P

SERVICE MANUAL

Vol. 1 (1st Edition)

BETACAM SP™

LITHIUM BATTERY
Replace the battery with a Sony CR2025 lithium battery. Use of another battery may present a risk of fire or explosion.

WARNING
Battery may explode if mistreated.
Do not recharge, disassemble or dispose of in fire.

Note
Keep the lithium battery out of the reach of children. Should the battery be swallowed, consult a doctor immediately.

ADVARSEL!
Lithiumbatteri - Eksplosionsfare ved fejlagtig håndtering.
Udskiftning må kun ske med batteri af samme fabrikat og type.
Levér det brugte batteri tilbage til laverandøren.

ADVARSEL
Lithiumbatteri - Eksplosjonsfare.
Ved utskifting benyttes kun batteri som anbefalt av apparatfabrikanten.
Brukt batteri returneres apparatleverandøren.

VARNING
Explosionsfara vid felaktigt batteribyte.
Använd samma batterityp eller en likvärdig typ som rekommenderas av apparattillverkaren.
Kassera använt batteri enligt gällande föreskrifter.

VAROITUS
Paristo voi räjähtää jos se on virheellisesti asennettu.
Vaihda paristo ainoastaan laitevalmistajan suosittelemaan tyyppiin.
Hävitä käytetty paristo valmistajan ohjeiden mukaisesti.

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Introducing this manual

This manual is the Service Manual Vol. 1 of the Portable Videocassette Recorder PVV-3/3P.
This manual contains the maintenance information of this equipment, and the information on services such as the replacement of the parts and the adjustments.

Contains

The sections covered in the manual are summarized below to give you a general understanding of the manual.

Section 1 OPERATING INSTRUCTION
Describes the contents of the operation manual related to the operations of this equipment.

Section 2 SERVICE OVERVIEW
Describes how to replace of the parts, the locations of the parts, switch setting, and error code on services.

Section 3 PERIODIC MAINTENANCE AND INSPECTION
Describes the periodic check and cleaning procedure.

Section 4 REPLACEMENT OF MECHANICAL PARTS
Describes how to replace the parts and how to adjust them after replacement.

Section 5 LINK SYSTEM ALIGNMENT
Describes the adjustment procedures of link system.

Section 6 TAPE PATH ALIGNMENT
Describes the adjustment procedures of tape path system.

Section 7 ELECTRICAL ALIGNMENT OVERVIEW
Describes the general information for electrical adjustments.

Section 8 POWER SUPPLY AND SYSTEM CONTROL ALIGNMENT
Describes the electrical adjustments of power supply and system control systems.

Section 9 SERVO ALIGNMENT
Describes the electrical adjustments of servo system.

Section 10 AUDIO ALIGNMENT
Describes the electrical adjustments of audio system.

Section 11 VIDEO ALIGNMENT
Describes the electrical adjustments of video system.

Section 12 ELECTRICAL ALIGNMENT WITH REPLACEMENT OF MECHANICAL PARTS
Describes the electrical adjustments with replacing the mechanical parts.

Related manuals

In addition to this Service Manual Vol. 1, the following manuals are provided.

- **Operation Manual (Supplied with equipment)**

Part No. 3-798-217-21 (English)
3-798-217-31 (French)
3-798-217-41 (Germany)
3-798-217-51 (Italian)
Describes how to operate this equipment.

- **Service Manual Vol. 2 (Not supplied with equipment)**

Part No. 9-977-613-21
Contains block diagrams, board layouts, schematic diagrams, semiconductor pin assingments and parts lists.

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SECTION 1
OPERATING INSTRUCTION

This section is extracted from operation manual.

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How to Use This Manual

Purpose and audience

This manual contains operating instructions for the PVV-3/3P Pro-Betacam SP Portable Videocassette Recorder. It is addressed to a wide range of people, ranging from experienced users of professional portable VTRs to those who have not used this type of VTR before. To make the best use of the functions of the PVV-3/3P (called the "unit" in this manual), please read this book carefully.

Organization of this manual

Chapter 1 Overview
Discusses some of the functions and features of the system, and shows an example system configuration. This chapter should be read before operating the unit.

Chapter 2 Location and Function of Parts
Gives the name and function of controls and other parts of the unit.

Chapter 3 Setting Up the Unit
Describes the preparations for using the unit, including notes on operation, the mounting of the unit on a video camera, and connections required.

Chapter 4 Operations
Covers all aspects of operation of the unit, including the basic procedures for recording and playback, the indications which appear in the display window, and how to use the VTR menu.

Chapter 5 Maintenance
Describes the warning system, troubleshooting, and care of the unit.

Appendix
Specifications

Chapter 1
Overview

This chapter describes some of the functions and features of this unit, and shows an example system configuration.

Feature 1-3
Example System Configuration 1-4

Features

The PVV-3/3P Portable Videocassette Recorder, featuring the quality of Sony's Betacam SP (Superior Performance) series, can be attached to a color video camera in the DXC-637/637P/537A/537AP/327A/327AP series for use as a combination camera/VTR (camcorder).
(You cannot attach this unit to video cameras in the DXC-325/325P/327/327P series because they are not compatible with component video signals.)

High-quality video and audio

- The Betacam SP format offers improved signal-to-noise ratio, better frequency response, and superior waveform and detail video recording/playback characteristics.
- The built-in Dolby C-type noise reduction[1] system offers high signal-to-noise ratios and excellent upper-range audio recording.
- Metal tape allows the unit to take full advantage of the SP format, for high-quality pictures and low-distortion audio over a wide bandwidth.

Compact and lightweight

The unit is small and light enough to be carried by a camera operator alone.

Playback

- Monochrome playbacks of the videotape recording can be displayed in the camera's viewfinder.
- Color playbacks can be displayed on a color TV or color video monitor when you connect an optional VA-300/300P/500/500P Playback Adaptor to the unit.
- The quick recording review feature, which automatically rewinds and plays back the last few seconds of the recording, allows the camera operator to check the recording just after it is done.

Built-in time code generator

The time code generator/reader is built in, making it easy to record the time code (LTC[2] and VITC[3]) required for precise editing.

1) Dolby noise reduction manufactured under license from Dolby Laboratories Licensing Corporation.

"DOLBY" and the double-D symbol ⊡⊡ are trademarks of Dolby Laboratories Licensing Corporation.

2) LTC: Abbreviation of Longitudinal Time Code. Time code recorded along the tape. A VTR cannot reproduce LTC when the tape stops to output a still picture. When the tape runs slowly, the output level of LTC is very low and readout is unreliable.

3) VITC: Abbreviation of Vertical Interval Time Code. A time code inserted during the vertical blanking interval between two fields. Unlike LTC time codes, VITC time codes are stored in the same tracks as the video information, so they can be read out precisely even while the tape is not moving.

A wide selection of power sources

You can use the following power supplies. (The continuous recording times mentioned are for a camcorder consisting of this unit and a video camera in the DXC-637/637P series.)

- An NP-1B Battery Pack gives a continuous recording time of about 60 minutes.
- An optional DC-500 Battery Adaptor makes it possible to use a BP-90A Battery Pack, which gives a continuous recording time of about 140 minutes.
- An optional BKW-L601 Battery Adaptor makes it possible to use a BP-L60/L90 Battery Pack.
- An optional AC-550/550CE AC Adaptor makes it possible to operate the unit on AC power.

Frame-accurate continuous recording

After recording one shot, it is possible to resume recording precisely at the next frame, simply by pressing the VTR button on the camera or lens. The same precision is available even after the cassette has been ejected and reinserted, using the unit's quick recording review function.

Compatibility with other Betacam SP VTRs

Metal tape cassettes recorded with this unit can be played back on any Betacam SP VTR, and a metal tape cassette recorded with any Betacam SP VTR can be played back on this unit.

VTR information displayed in the viewfinder

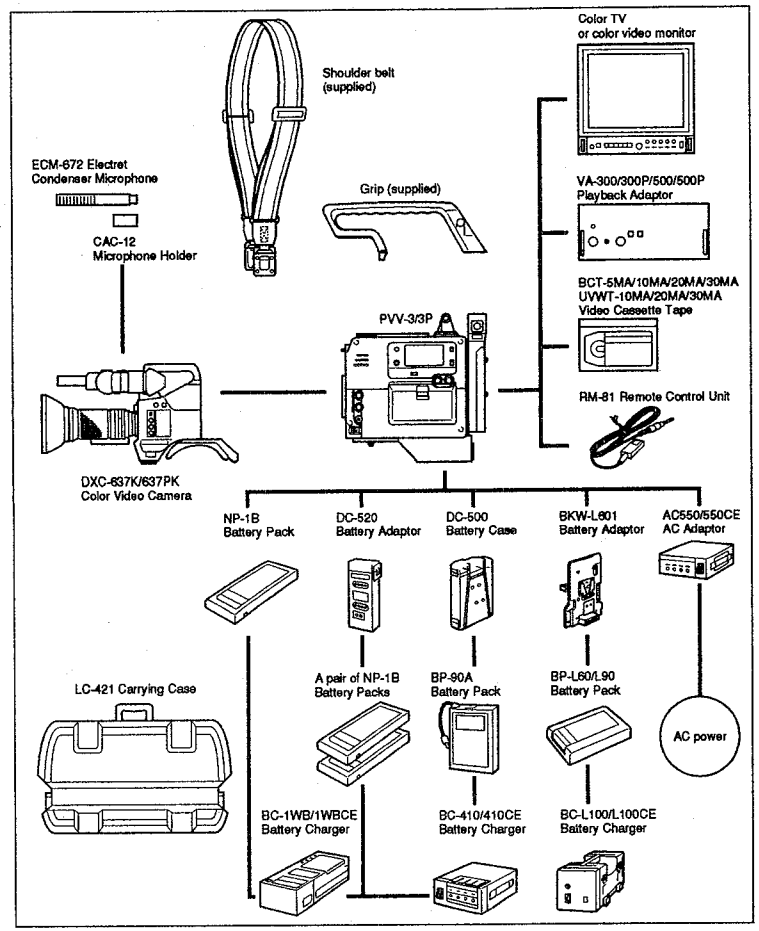
Information on the state of this unit can be displayed in the viewfinder of the video camera.

Note

Depending on the video camera model, this feature may not be available.

Example System Configuration

This unit can be attached to a color video camera in the DXC-637/637P/537A/537AP/327A/327AP series to make up a combination camera/VTR.
The diagram below shows an example camera/VTR system configuration in which the camera is a DXC-637K or DXC-637PK depending on whether the VTR is an PVV-3 or PVV-3P.



Example system configuration

Chapter 2
Location and Function of Parts

This chapter describes the location and function of the parts of the unit which it is necessary to understand before operating the unit.

Power Supply and Display 2-2
Shoulder Strap Fitting and Input/Output Connectors 2-4
Recording/Playback Functions 2-6
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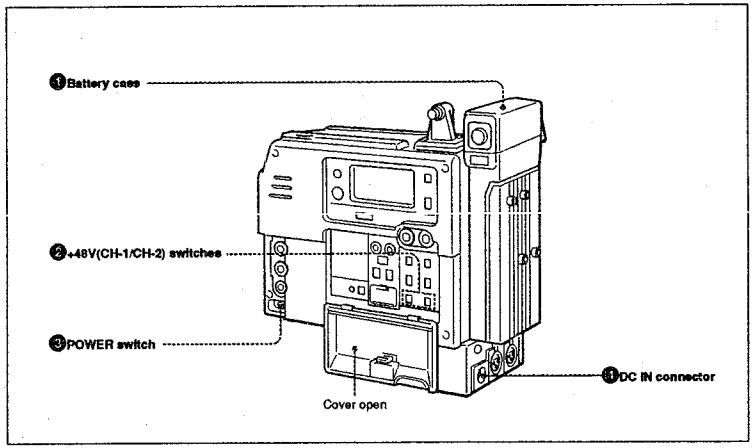
Power Supply and Display

Power supply



Power supply

❶ Battery case
Insert an NP-1B Battery Pack (not supplied).

For details of the battery loading procedure, see the section "Using the NP-1B Battery Pack" (page 3-10).

❷ +48V (CH-1/CH-2) switches
These switches control the 48V power supply to the CH-1/CH-2 (+48V) connectors. When one of these switches is on, the corresponding one of the AUDIO IN (CH-1/CH-2) switches should be set to MIC, and the corresponding connector can be used for a microphone requiring a 48V supply.

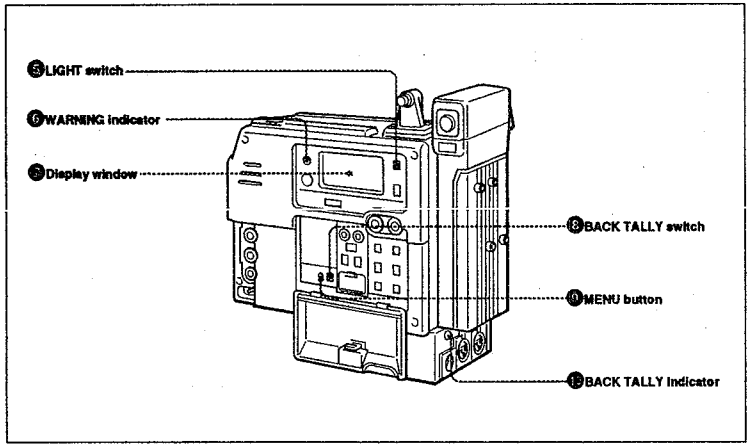
Note

If you connect a microphone not compatible with a 48V supply to one of the CH-1/CH-2 (+48V) connectors while the corresponding one of the +48V (CH-1/CH-2) switches is in the ON position, **the microphone may be damaged**. Check the power supply used by the microphone and the switch settings before making the connection.

❸ POWER switch
This powers the unit on and off.
When recording with this unit attached to a video camera, set the POWER switch on the camera to ON also.
The camera POWER switch is disabled when this switch is set to OFF.

❹ DC IN connector (XLR 4-pin, male)
Use a CMA-8A/8ACE camera adaptor or AC-550/550CE AC Adaptor to supply power from an AC outlet to this connector.

Display



Display

❺ LIGHT switch
This turns the display window lighting on or off.

❻ WARNING indicator
This lights or flashes when there is an operating problem with the unit.

For details, see the section "Warning System" (page 5-2).

❼ Display window
This displays time values, audio levels, tape remaining, battery state, non-drop-frame (NDF) indication (for NTSC only), warnings, and head drum operating hours.

For details, see the section "Indications in the Display Window" (page 4-10).

❽ BACK TALLY switch
This switch determines whether or not the BACK TALLY indicator operates.

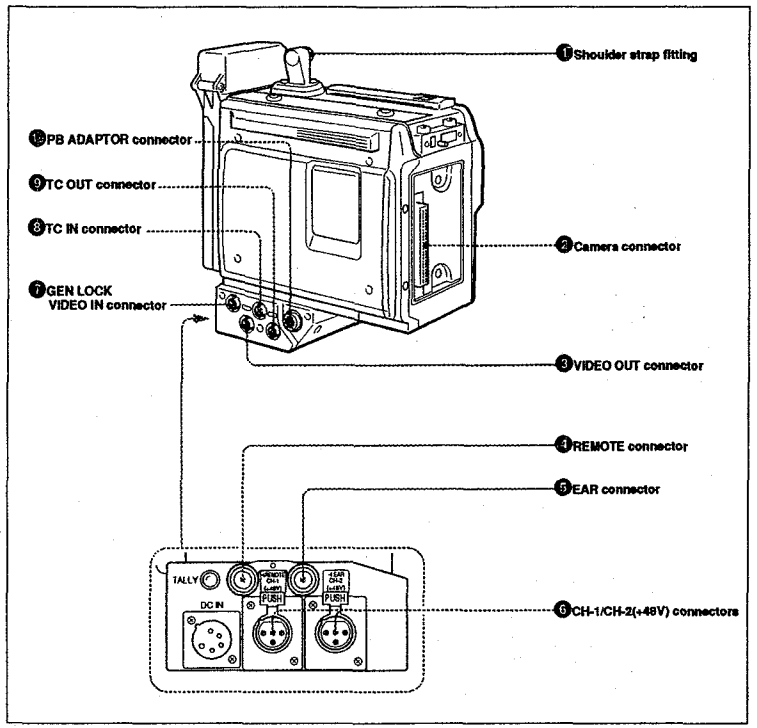
❾ MENU button
Use this button to access the VTR menu, for settings such as date and time, and drop-frame or non-drop-frame (for NTSC only).

For details see the section "Using the VTR Menu" (page 4-20).

❿ BACK TALLY indicator (red)
This lights during recording with the BACK TALLY switch set to ON.
This indicator also flashes to indicate warnings in the same manner as the REC/TALLY indicator in the viewfinder of the video camera.

For details about the warning functions of the REC/TALLY indicator, see the section "Warning System" (page 5-2).

Shoulder Strap Fitting and Input/Output Connectors



Shoulder strap fitting and input/output connectors

❶ Shoulder strap fitting
Use this to attach the supplied shoulder strap.

❷ Camera connector (50-pin)
Connect the 50-pin connector (for VTR connection) of a video camera in the DXC-637/637P/537A/537AP/327A/327AP series.

❸ VIDEO OUT connector (BNC)
This outputs the video signal from the camera.

Note

It is not possible to monitor video being played back or recorded by the built-in VTR using this connector.

❹ REMOTE connector (mini-jack)
Connect an RM-81 Remote Control Unit (not supplied). You can use the RM-81 instead of the VTR button on the video camera or lens to control starting and stopping of recording.

Note

Be careful not to confuse the REMOTE and EAR connectors, both of which are mini-jacks.

❺ EAR connector (stereo mini-jack)
Connect an earphone or headphones. This outputs the sound which was output to the speaker, but mutes the speaker.

❻ CH-1/CH-2 (+48V) connectors (XLR 3-pin, female)
Connect a microphone or external equipment to each of these connectors.
When using a signal input to either of these connectors, set the corresponding AUDIO IN (CH-1/CH-2) switch to MIC or LINE, depending on the equipment connected.

❼ GEN LOCK VIDEO IN connector (BNC)
When synchronizing the camera to an external signal, input a reference video signal (VBS [1] or BS [2]) from external equipment to this connector.

❽ TC (time code) IN connector (BNC)
Input an external signal for synchronizing the built-in time code generator output signal. Use an SMPTE (for NTSC)/EBU (for PAL) longitudinal time code (LTC) signal.

Note

Use a jitterless LTC signal. Using an LTC signal reproduced by other equipment may cause this unit to malfunction.

❾ TC (time code) OUT connector (BNC)
Outputs the time code signal from the built-in time code generator. When a signal is input to the TC IN connector, this output signal is synchronized to it.

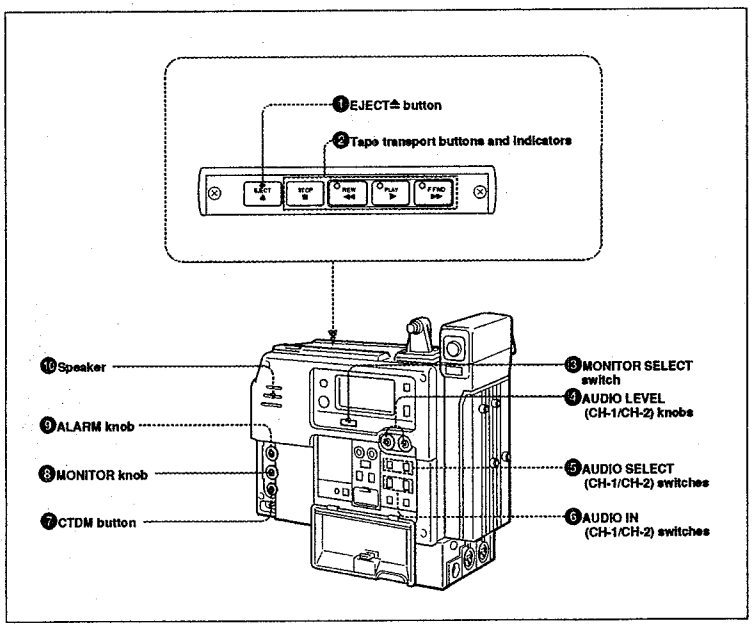
❿ PB (playback) ADAPTOR connector (round, 20-pin)
For color playback monitoring from the built-in VTR, connect a VA-300/300P/500/500P Playback Adaptor (not supplied) to this connector.

Note

When this unit is loaded with a charged battery pack or connected to an AC power supply, power is supplied from this connector regardless of the setting of the POWER switch. Therefore, when not using the playback adaptor connected, make sure it is turned off.

1) **VBS:** Video, Burst and Sync
2) **BS:** Burst and Sync

Recording/Playback Functions



Recording/Playback functions

❶ EJECT ≜ button
Press this button to open the cassette holder.

❷ Tape transport buttons and indicators
These control the tape transport as follows.
REW ◀◀: Rewinds the tape. While the tape is being rewound, the indicator lights.
F FWD ▶▶: Fast forwards the tape. While the tape is being fast forwarded, the indicator lights.
PLAY ▶: Plays back the recorded video. During playback, the indicator lights.
STOP ■: Stops the tape

Note
During recording, none of these buttons operates.

❸ MONITOR SELECT switch
This selects the audio output to the speaker or earphones.
CH-1: channel 1 audio
MIX: channels 1 and 2 mixed
CH-2: channel 2 audio

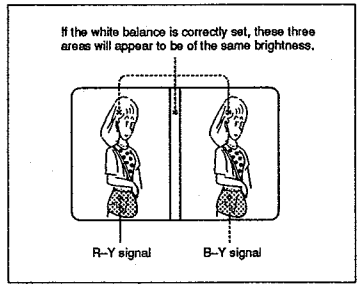
❹ AUDIO LEVEL (CH-1/CH-2) knobs
When the AUDIO SELECT (CH-1/CH-2) switches are set to MANUAL, these knobs adjust the audio recording levels on the corresponding channels.

The audio levels are shown in the display window. For details, see the section "Indications in the Display Window" (page 4-10).

❺ AUDIO SELECT (CH-1/CH-2) switches
These select the audio level adjustment method for each of channels 1 and 2.
AUTO: Use the AGC circuit to adjust the audio level automatically.
MANUAL: Adjust the audio level manually, using the AUDIO LEVEL (CH-1/CH-2) knobs. There is a limiter circuit to prevent excess levels, thus allowing recording with low distortion.

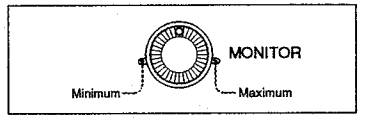
❻ AUDIO IN (CH-1/CH-2) switches
These select the input signals to audio channels 1 and 2.
CAM: The signal from the microphone built into the camera or connected to the MIC IN +48V connector of the camera
MIC: The signal from a microphone connected to the CH-1/CH-2 (+48V) connectors
LINE: The line signal connected to the CH-1/CH-2 (+48V) connectors

❼ CTDM button
This is for CTDM [1] playback. To check the color difference signals during playback, hold down this button. The R–Y and B–Y signals appear in monochrome on the left and right halves of the split screen.



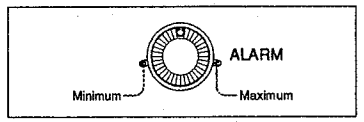
Checking the color difference signals

❽ MONITOR knob
This controls the volume of the sound other than the warning on the speaker or from the earphone. On the minimum setting, the sound is not audible at all.



MONITOR knob

❾ ALARM knob
This controls the volume of the warning sound given on the speaker or from the earphone. On the minimum setting, the warning sound is not audible at all.



ALARM knob

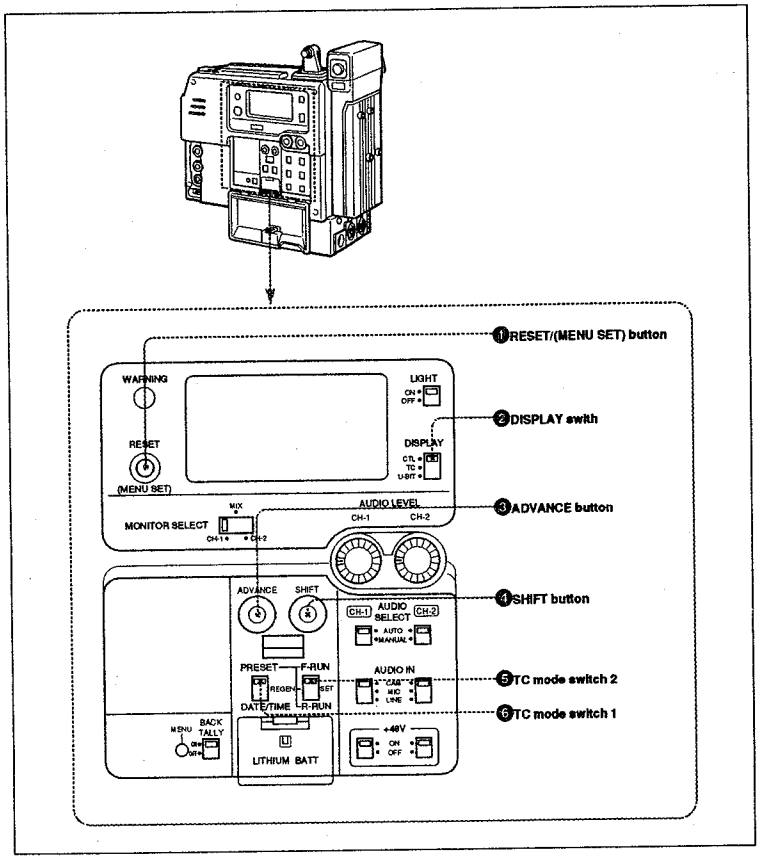
❿ Speaker
During recording the speaker relays the input audio signal in E-E mode [2], and during playback it outputs the playback audio. The speaker also sounds a warning tone when there is an error indication in the viewfinder or display window. If an earphone is connected to the EAR connector, the speaker does not sound.

For details of the warning tone, see the section "Warning System" (page 5-2).

1) **CTDM:** Compressed Time Division Multiplex. Because the two color difference signals (R–Y and B–Y) have a much smaller bandwidth than the luminance signal, they can be compressed by a factor of two in time, and multiplexed into a single signal.

2) **E-E mode:** Electric-to-Electric mode. The input signals which pass through the recorder's electronics are supplied from the output connectors.

Time Code Functions



Time code functions

❶ RESET/(MENU SET) button

This resets the time value shown in the display window. The effect of this button depends on the settings of the DISPLAY switch and TC mode switches 1 and 2, as shown in the following table.

Switch settings	RESET/(MENU SET) button effect
DISPLAY: CTL	Resets the CTL count to "00:00:00:00".
DISPLAY: TC TC mode 1: PRESET TC mode 2: SET	Resets the time code value to "00:00:00:00".
DISPLAY: U-BIT TC mode 1: PRESET TC mode 2: SET	Resets the user bit[a] value to "00 00 00 00".

a) User bits: A 32-bit section of time code in which a user can record necessary information.

This button is also used to change settings in the VTR menu.

For details of the VTR menu, see the section "Using the VTR Menu" (page 4-20).

❷ DISPLAY switch

This selects the value to be shown in the time value indication in the display window.

CTL: Shows a count of the playback or recording CTL (control) signal pulses expressed in hours, minutes, seconds and frames.

TC: Shows the SMPTE (for NTSC)/EBU (for PAL) time code value.

U-BIT: Shows the user bit value within the SMPTE (for NTSC)/EBU (for PAL) time code.

When you set this switch to TC or U-BIT, normally the LTC value appears in the display window, but it is also possible to display the information recorded in the VITC user bits *(page 4-17)*.

For details of the display window indications, see the section "Indications in the Display Window" (page 4-10).

❸ ADVANCE button

When setting time code and user bit values, pressing this button increments the digit selected with the SHIFT button.

❹ SHIFT button

When setting time code and user bit values, press this button to select the digit to be incremented with the ADVANCE button.
The selected digit flashes.

For details of the method of setting time code and user bit values, see the sections "Setting the Time Code Value" (page 4-13) and "Setting the User Bit Value" (page 4-16), respectively.

❺ TC (time code) mode switch 2

This switch determines the way in which time code values advance when TC mode switch 1 is set to PRESET.

F-RUN: Free-run mode. The time code advances continuously, whether or not the VTR is recording. Thus the time code value can be aligned with real time.

SET: Set the switch to this position to set the time code or user bit value.

R-RUN: The time code advances only during recording. Consecutive recordings on the tape have consecutive time code values.

Note

In NTSC systems, there are two time code operation modes: drop-frame (DF) and non-drop-frame (NDF). The unit PVV-3 is shipped with drop-frame mode selected.

For details of how to select drop-frame or non-drop-frame mode, see the section "Selecting drop-frame/non-drop-frame mode (for NTSC only)" (page 4-22), and for the meanings of these modes, see the section "Drop-frame mode (for NTSC only)" (page 4-15).

❻ TC (time code) mode switch 1

This switch determines whether the time code for a recording is made continuous from the previous recording on the tape, or starts afresh.

REGEN: Reads the existing time code on the tape, and sets the time code starting value accordingly. Thus, even when there is an indefinite break in recording, this setting ensures that time codes on the tape will be continuous. Regardless of the setting of TC mode switch 2, in this position the unit is always in R-RUN mode.

PRESET: Starts recording time code values on the tape from the currently set value.

DATE/TIME: This synchronizes the time code to the real time clock set in the VTR menu *(page 4-20)*. In this case the time code is recorded in drop-frame mode (for NTSC only).

Chapter 3
Setting Up the Unit

This chapter describes the preparations for using the unit, including notes on operation, the mounting of the unit on a video camera, and connections required.

Notes on Operation 3-2
- Safety Notes 3-2
- Looking After the Unit 3-2
- Condensation 3-3

Connecting Equipment 3-4
- Mounting on Video Camera 3-4
- Connecting a Wireless Microphone 3-4
- Connecting Audio Line Signals 3-5
- Fitting the Shoulder Strap 3-6
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Power Sources 3-10
- Using the NP-1B Battery Pack 3-10
- Using the BP-90A Battery Pack 3-12
- Using the BP-L60/L90 Battery Pack 3-12
- Using an AC Power Supply 3-12

Fitting/Replacing the Lithium Battery 3-13

Notes on Operation

Safety Notes

Power supply
The unit operates on a 12 V DC supply. Use only the specified power supplies *(page 3-10)*.

Do not disassemble
The unit includes precision components: do not attempt to disassemble it, as this can lead to malfunction.

Foreign bodies
Be careful not to let any foreign bodies, especially metallic objects or water, get inside the unit, as this can lead to malfunction.

Looking After the Unit

Do not cover with cloth
While the unit is in operation, do not cover it with a cloth or other material. This can cause the temperature to rise, leading to a malfunction.

Use and storage locations
Avoid using or storing the unit in the following places:
- Where it is subject to extremes of temperature (outside 0 °C to 40 °C (32 °F to 104 °F)).
  Note that in summer the temperature in a car with the windows closed can reach 50 °C (122 °F).
- Very damp or dusty places.
- Where rain is likely to reach the unit.
- Places subject to severe vibration.
- Near strong magnetic fields such as radio or TV transmitters.

After use
Turn the POWER switch off.

When not used for a period of time
Remove the battery pack.

Shipping
When transporting the unit, as far as possible use either the optional carrying case or the original packing.
If shipping the unit as freight by truck, ship or airplane, pack it in the carrying case, then pack the carrying case in its own packing or similar.

Care
If the body of the unit is dirty, wipe it with a dry cloth. For severe dirt, use a soft cloth steeped in a small amount of neutral detergent, then wipe dry. Do not use volatile solvents such as alcohol or thinners, as these may damage the finish.

In the event of problems
Contact your local Sony service representative.

Condensation

If you move the unit suddenly from a very cold place to a warm place, or use it in a very humid location, condensation may form on the head drum. If the unit is operated in this state, the tape may adhere to the drum, and **cause a failure or even permanent damage.** Take the following steps to prevent this from happening:
- Remove the cassette before moving the unit from a very cold place to a warm place.
- Before inserting a cassette, turn the power on, and check that the HUMID indication is not showing in the display window. If it is showing, condensation is present: do not insert a cassette, and wait until the condensation has disappeared. At this point the condensation will evaporate more rapidly if you leave the unit powered on.
- If condensation occurs while a cassette is loaded, the unit stops operating. Press the EJECT button to remove the cassette, and wait until the HUMID indication disappears.
- Once condensation has occurred, it may take a considerable time before the unit can be operated. As far as possible, keep the unit in a place at normal temperature and low humidity.

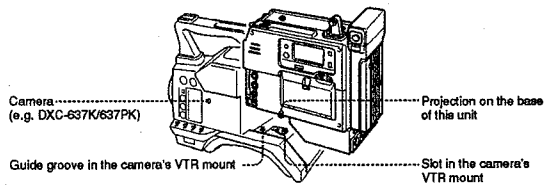
For details of cassette insertion and removal, see the section "Inserting and Removing Cassettes" (page 4-3), and for details of the HUMID indication, see the section "Warning System" (page 5-2).

Connecting Equipment

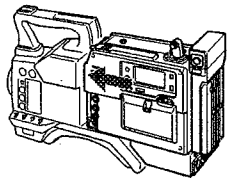
Mounting on Video Camera

Use the following procedure to mount the unit on a video camera.

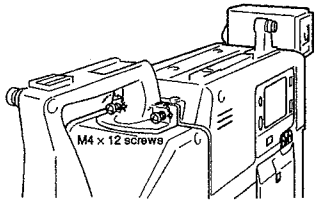
1 Fit the projection on the base of this unit into the slot in the camera's VTR mount.


Camera
(e.g. DXC-637K/637PK)
Projection on the base of this unit
Guide groove in the camera's VTR mount
Slot in the camera's VTR mount

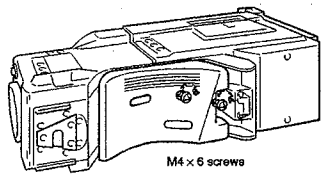
2 Slide this unit along the guide groove in the camera's VTR mount, and press firmly until fixed.



3 Secure with two M4 × 12 screws (attached) near the camera's grip.



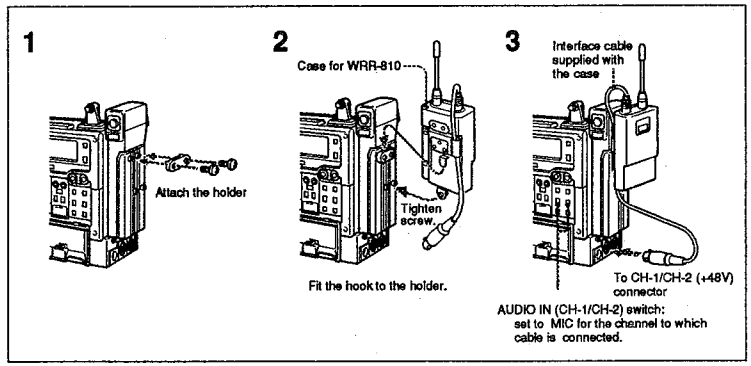
4 Fix the camera's shoulder pad with two M4 × 6 screws (attached).



Removing from camera
Follow the procedure above in reverse.

Connecting a Wireless Microphone

Using separately available components such as the WRT-810A/830A Wireless Microphone and WRR-810 UHF Portable Tuner, you can use a Sony wireless microphone system as an audio input source.
To connect a WRR-810 to this unit, use the special case attached to the back of the unit, as shown in the following figure.

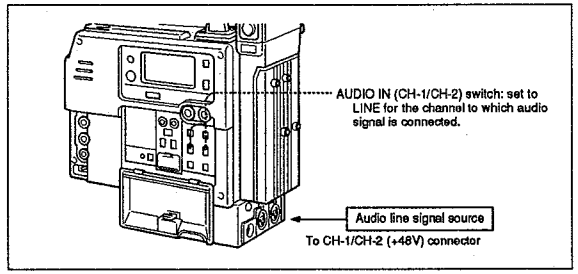

1
Attach the holder
2
Case for WRR-810
Tighten screw.
Fit the hook to the holder.
3
Interface cable supplied with the case
To CH-1/CH-2 (+48V) connector
AUDIO IN (CH-1/CH-2) switch: set to MIC for the channel to which cable is connected.

Connecting a wireless microphone system

For details of operation of the wireless microphone system, refer to the operating instructions supplied with the wireless microphone system.

Connecting Audio Line Signals

Connect an external audio line signal from a stereo amplifier or other equipment as shown in the following figure.

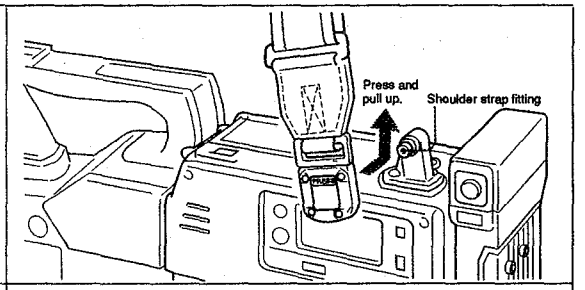

AUDIO IN (CH-1/CH-2) switch: set to LINE for the channel to which audio signal is connected.
Audio line signal source
To CH-1/CH-2 (+48V) connector

Connecting audio line signals

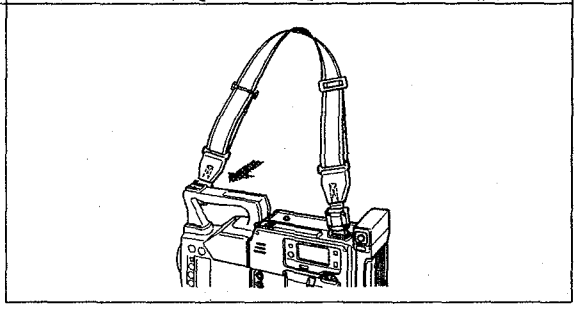
Fitting the Shoulder Strap

To use the supplied shoulder strap for carrying the camcorder, use the following procedure to fasten it to the fitting points.

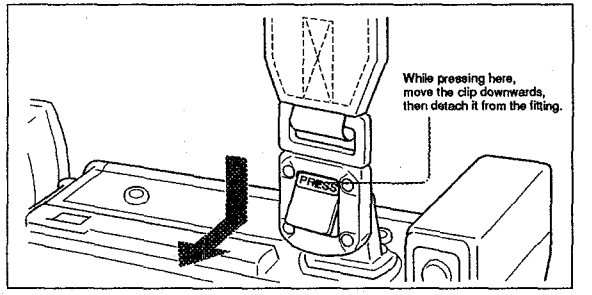
1 Fit a clip of the strap to the grip of this unit.



2 Fit the other clip of the strap to the video camera.



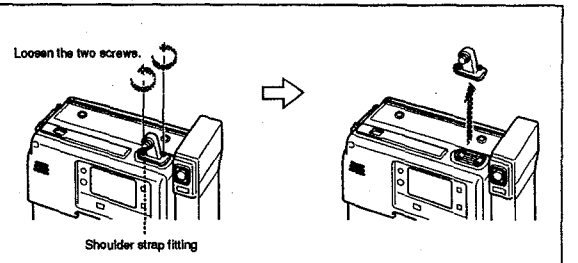
How to remove



Attaching the Grip

To attach the supplied grip, proceed as follows.

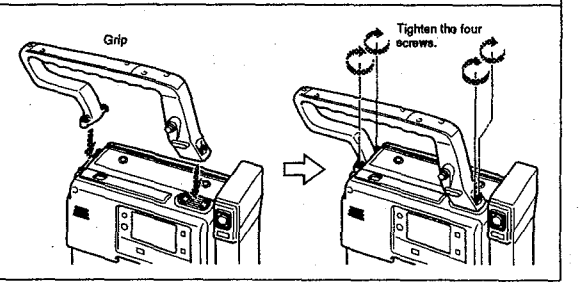
1 Remove the shoulder strap fitting.
(Retain the removed fitting for later use.)



2 Attach the grip.

Note

Tighten the screws firmly to prevent the unit from rattling or falling. The recommended torque for tightening the screws is 1.4 Nm (14 kg·cm).

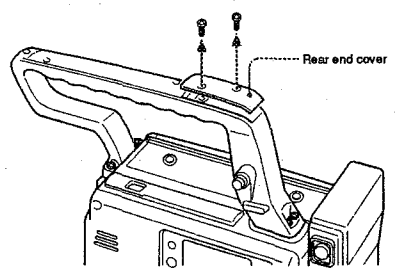


Connecting Equipment

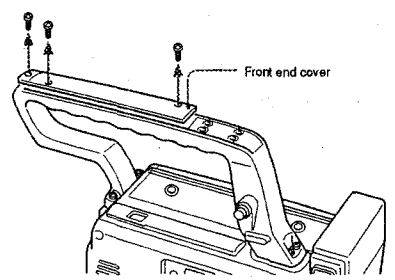
Passing the video light cable through the grip

If you mount a video light on the video camera, you can use the following procedure to pass the power cable for the light through the grip.

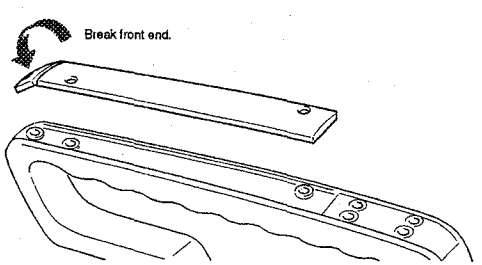
1 Remove the cover at the rear end of the grip.



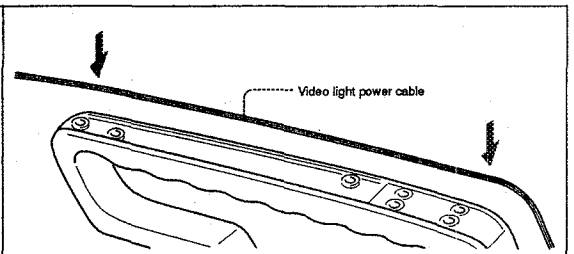
2 Remove the cover at the front end of the grip.



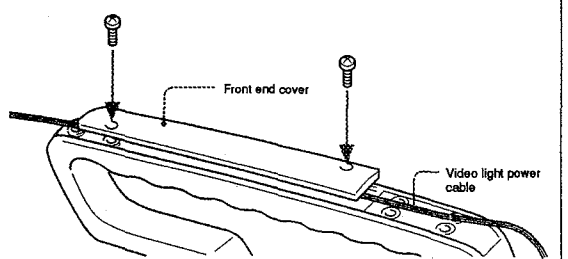
3 Bend the front end of the cover removed in step **2** to break it off at the scored line.



4 Lay the video light power cable in the slot along the top of the grip.



5 Ensuring that the power cable is neatly tucked into place in the slot without passing over the screw holes, replace the cover removed in step **2**, and fasten with screws. (The rear cover removed in step **1** is not used.)



Connecting a Remote Control Unit

By connecting an optional RM-81 Remote Control Unit to the REMOTE connector, you can start and stop recording by remote control.

Notes

- Always turn the unit off before connecting or disconnecting the remote control unit.
- Be careful not to confuse the REMOTE connector with the EAR connector on the right side of the unit.

For details of operation, refer to the operation manual supplied with the RM-81 Remote Control Unit.

Power Sources

This unit can operate from either a battery pack or an AC power supply.

Anton Bauer Magnum Battery System and Superlight System
Equipping the unit with a special battery mount developed by Anton Bauer Corporation enables you to use the Anton Bauer Magnum battery and the Anton Bauer Superlight System.

For details, contact an Anton Bauer dealer or your Sony service representative.

Using the NP-1B Battery Pack

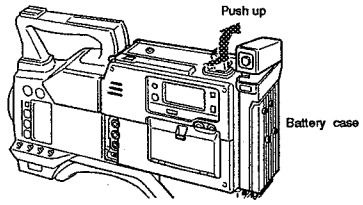
Before use, always charge the battery pack with a BC-1WB/1WBCE Battery Charger.

Notes

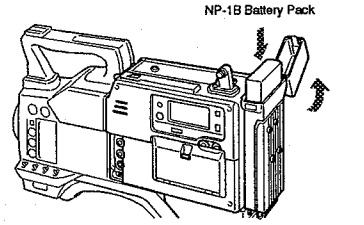
- Do not allow metal objects to come into contact with the metal parts of the battery pack. **There is a danger of a short circuit.**
- When not using the unit for a considerable period, remove the battery pack.
- Immediately after use the battery pack is somewhat warm. It may not be possible to charge it fully while it is still warm.

To load the battery pack, proceed as follows.

1 Open the cover of the battery case.



2 Insert a fully-charged battery pack and close the battery case.



NP-1B Battery Pack operating time

The unit connected with a DXC-637/637P series video camera will operate for **about 60 minutes of continuous recording** using a fully-charged NP-1B Battery Pack at normal temperatures. Very low temperatures may reduce the operation time.

Using two NP-1B Battery Packs simultaneously

Use a DC-520 Battery Adaptor. In this case the **continuous recording time is about 120 minutes** (with a DXC-637/637P series video camera connected).

For more details, refer to the operation manual supplied with the DC-520.

Note

When using two NP-1B Battery Packs simultaneously, always replace the two battery packs at the same time. If you replace one only, the newly replaced battery pack may be subjected to an excessive load, resulting in the internal circuit breaker tripping.

Battery capacity indication

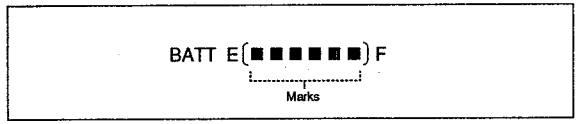
When the battery pack is almost exhausted, "BATT" in the display window flashes every second. At this point, replace with another fully-charged battery pack.
If you continue to operate the unit without replacing the battery pack, "BATT" will start flashing four times a second and the unit will stop operating.

Note

Always power off the unit before replacing the battery pack.

Checking the battery level

When the POWER switch is on, the BATT indication in the display window shows the battery level. If the battery pack is fully charged, there are six marks visible between "E" and "F".



Checking the battery level with the BATT indication

For more details about the BATT indication, see the section "❻ Battery capacity indication" (page 4-11).

Power Sources

Using the BP-90A Battery Pack

Using an optional DC-500 Battery Case, you can operate the unit from a BP-90A Battery Pack.
By using the battery pack as an internal power source, and an external battery (for example a BP-90A in a DC-210 Battery Adaptor) connected to the DC IN connector, you can use both battery packs together.

For more details, refer to the operation manual supplied with the DC-500.

BP-90A Battery Pack operating time
This unit connected with a DXC-637/637P series video camera will operate for **about 140 minutes of continuous recording** with a fully-charged BP-90A Battery Pack.

Using the BP-L60/L90 Battery Pack

Using an optional BKW-L601 Battery Adaptor, you can operate the unit from a BP-L60/L90 Battery Pack.

For more details, refer to the operation manual supplied with the BKW-L601.

Using an AC Power Supply

You can use an optional AC-550/550CE AC adaptor.

Notes

- When a power supply is connected to the DC IN connector, the unit always switches from the internal battery pack to use the external power source.
- There may be some noise on the video signal at the instant the power supply is switched.

Fitting/Replacing the Lithium Battery

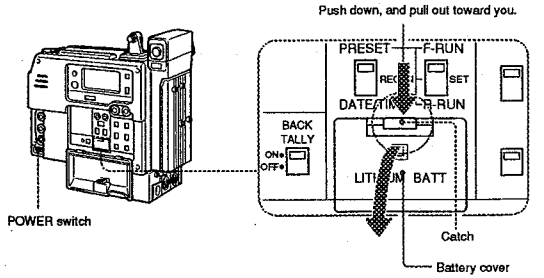
The lithium battery is needed to maintain some of the internal settings of the unit. **When using the unit for the first time, be sure to fit the lithium battery (type CR2025) supplied with the unit.** Using the unit without the lithium battery may result in faulty operation.
If the voltage of the lithium battery falls, a warning indication (LI) appears in the display window. If this warning appears, replace the lithium battery **within two or three days**, using a type CR2025 button cell.
Use the following procedure to fit or replace the lithium battery.

Note

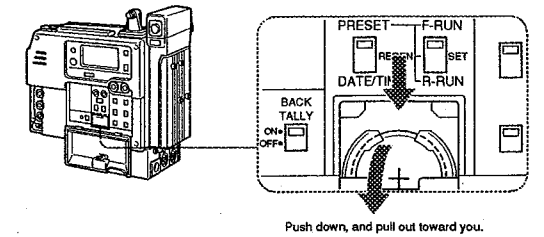
Read the instructions for the lithium battery carefully when fitting or exchanging the lithium battery. **Mishandling of a lithium battery may result in an explosion.**

1 Turn the POWER switch on.

2 Press down the catch at the top of the battery cover, and pull toward you.



3 Take out the lithium button cell.



4 Reverse step **3** to insert a replacement lithium button cell.
Take care that **the positive side of the cell, marked with a plus sign is toward you.**

5 Reclose the battery cover.

The lifetime of the lithium battery is approximately two years.

Chapter 4
Operations

This chapter describes all aspects of operation of the unit, including the basic procedures for recording and playback, the indications which appear in the display window, and how to use the VTR menu.

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Cassettes

Cassettes Used in This Unit

This unit uses S-size 1/2-inch Betacam SP metal tape cassettes. The type numbers of these tapes, with their recording times, are shown in the following table.

Type	Recording time (min/sec)
BCT-5MA	5
BCT-10MA/UVWT-10MA	10 (NTSC)/11 (PAL)
BCT-20MA/UVWT-20MA	20 (NTSC)/23 (PAL)
BCT-30MA/UVWT-30MA	30 (NTSC)/35 (PAL)

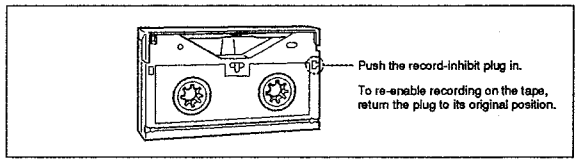
Note

If you insert an oxide tape such as a BCT-5G/10G/20G/30G tape, the unit ejects it automatically.

Notes on Using Cassettes

Preventing erasure

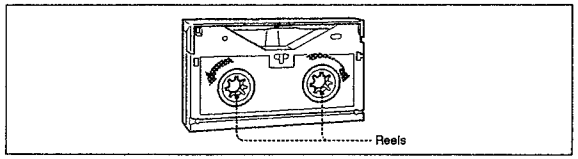
To protect recording on a tape, by preventing inadvertent erasure, do as follows.



Preventing erasure

Checking the tape for slack

Push in the reels with a finger and turn gently in the directions shown by arrows. If the reels will not move, there is no slack.



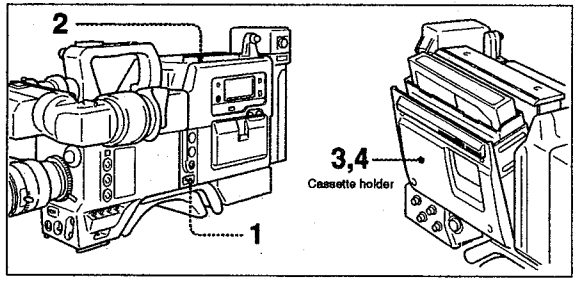
Checking the tape for slack

Inserting and Removing Cassettes

Note

When the cassette holder is open, the delicate internal mechanism, particularly the tape transport and drum, is exposed. Take care not to insert cassettes other than in the position illustrated below or to let any foreign bodies get in the tape compartment, as this can lead to damage to the mechanism.

Inserting a cassette



Inserting a cassette

1 Set the POWER switch of this unit to ON.

2 Press the EJECT button to open the cassette holder.

You can press the EJECT button even when the cover is closed.

3 Check the points below, then insert the cassette with the window outward.
- When recording, the cassette must not have the record-inhibit plug pushed in.
- There must be no slack in the tape.

4 Close the cassette holder by pressing the point marked "PUSH" on the cassette holder.

Removing the cassette

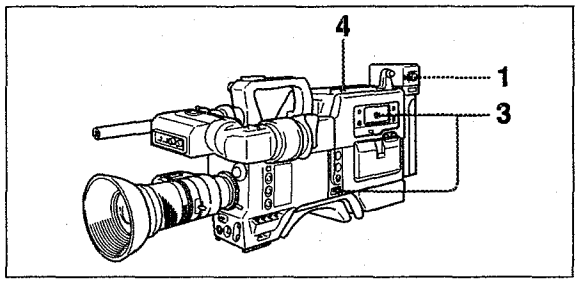
With the power supply on, press the EJECT button so that the cassette holder opens, then take out the cassette.
Then close the cassette holder. The panel at the top of the cassette holder then comes down.

Basic Operations

This section describes the basic operations for recording and playback.

Recording

From powering on to loading a cassette



Powering on and loading a cassette

1 Load a fully charged battery pack.

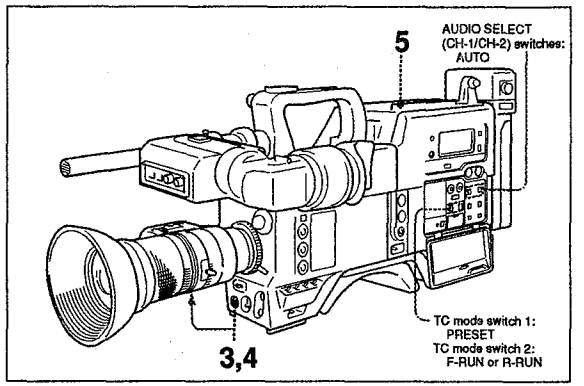
2 Make the necessary connections to other equipment.

3 Turn the POWER switch on, and check that the HUMID indication has not appeared in the display window and that the BATT indication is not flashing.
- If the HUMID indication is showing, wait until it disappears *(page 5-2)*.
- If the BATT indication is flashing, replace the battery pack with a fully charged one *(page 5-2)*.

4 Press the EJECT button to open the cassette holder.

5 Load the cassette, after checking the points below, then close the cassette holder.
- The cassette is not set to inhibit recording *(page 4-2)*.
- There is no slack in the tape *(page 4-2)*.

From switching setting to end of recording



From switch setting to end of recording

1 After powering on this unit and the camera and inserting a cassette, set the switches of this unit as shown above.

2 Make necessary settings and adjustments on the camera.

For how to set and adjust the camera, refer to the camera's operation manual.

3 Press the VTR button on the camera body or lens.
Recording begins, and the REC/TALLY indicator in the camera's viewfinder lights.
The BACK TALLY indicator of this unit also lights, after flashing until recording begins.

4 To pause recording, press the VTR button once more.
The REC/TALLY indicator goes off and the unit pauses[1].

(Continued)

1) **Paused state:** When the unit pauses, it enters either of the following two modes, standby-on or standby-off, depending on whether the POWER switch of the camera is set to ON STBY or OFF SAVE. In paused state, whether in standby-on or standby-off mode, you can use the continuous recording function.
- **Standby-on mode** (camera POWER switch set to ON STBY): The recorder is on standby, with the drum rotating and the tape held in tension by the pressure of the capstan and pinch rollers. In this state, recording starts within about 0.3 second of pressing the VTR button.
- **Standby-off mode** (camera POWER switch set to ON SAVE): Although the tape is wound round the drum, the drum is stationary and the capstan and pinch roller pressure is not applied. It takes about 3 seconds to start recording after the VTR button is pressed.

5 To end recording after pausing, press the STOP button.
The unit enters standby-off mode. In this state, you cannot use the continuous recording function (see the section Recording Continuity below).

Notes

- During recording, the tape control buttons (EJECT, REW, F FWD, PLAY, and STOP on this unit and, REC REVIEW on the camera) have no effect.
- If you set the POWER switch of the camera to OFF during recording, this unit will stop recording, causing:
  - the WARNING indicator to light,
  - the warning tone to sound,
  - the REC/TALLY indicator in the viewfinder to flash.
- If you leave the unit in standby-on mode for eight minutes (you can change the period), then to protect the tape, the unit automatically releases the tape tension (standby-off mode).

To change the maximum period that the unit will stay in the paused state, see the section "Using the VTR Menu" (page 4-20).

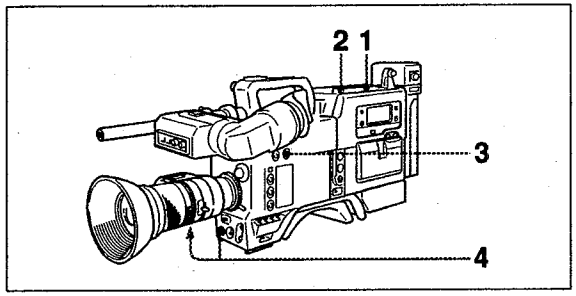
Recording Continuity

As long as the camera POWER switch is in the ON STBY or ON SAVE position, pressing the camera or lens VTR button repeatedly to start and stop recording results in a continuous recording on the tape. Setting the POWER switch of the camera to ON SAVE reduces the power consumed by the camcorder, allowing you to use the same battery pack for longer periods. Compared with when the POWER switch is set to ON STBY, however, the unit will take a little longer before starting recording after the VTR button on the camera or lens is pressed.
To make the time code recorded on the tape also continuous, set the TC mode switches 1 and 2 to PRESET and R-RUN respectively.
If, however, you do any of the following things during shooting, pressing the VTR button will not result in continuous recording.

- Eject the cassette
- Playback, fast forward, or rewind the tape
- Press the STOP button in the tape transport section.

Making a continuing recording on an already recorded tape

It is possible to record from an intermediate point on an already recorded tape. In this case, to make the time code also continuous, see the section "Making the time code continuous" *(page 4-15)*.



Making a continuing recording on an already recorded tape

1 Press the PLAY button, and watch the playback in the viewfinder.

2 At the point from which you wish to continue recording, press the STOP button.

3 Press the REC REVIEW button on the camera body.
This cues up the tape to the point at which you pressed the STOP button.

4 Press the camera or lens VTR button to begin recording.

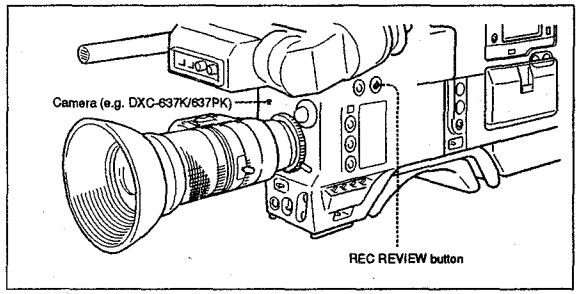
Note

If you turn the POWER switch off during recording, or when recording is paused, the unit automatically goes through its shut-down sequence, then powers off. When you next turn the POWER switch on, the unit automatically finds the point at which recording ended, and sets itself up so that you can carry on with continuous recording. Note that this operation takes several seconds: do not turn the POWER switch off or replace the battery during this interval, as the automatic recording continuity will be lost.
Note also that the recording continuity is lost in the following cases:

- If the POWER switch is turned on and off repeatedly.
- If the unit is left powered off for several hours.
- If the unit is subject to severe vibration while powered off.
- If for any other reason the automatic recording continuity function is unable to operate correctly.
- If the lithium battery (CR2025) is exhausted, or if no lithium battery has been fitted.

Recording Review Function

The recording review function enables you to check the last few seconds of recording in the viewfinder.



Recording review function

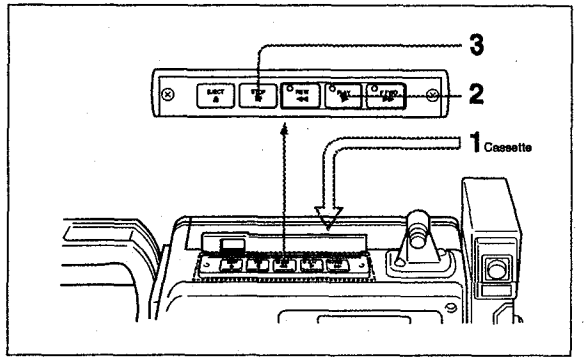
With recording paused, press the REC REVIEW button on the camera body. Depending on how long you hold down the REC REVIEW button, the unit automatically rewinds the tape for between two and ten seconds before the pause, and plays back this section in monochrome in the viewfinder, also outputting the sound to the earphone or speaker. After the playback, the unit returns to the paused state.

Notes

- If during recording review you press the VTR button or the REC START/STOP button, on an RM-81, the recording review function is abandoned, and recording starts. In this case it is not possible to make the recording continuous from the previous recording.
- When the recording time before a pause is less than 1 second, you cannot use the recording review function.

Viewing Playbacks in the Viewfinder

Monochrome playback may be viewed through the camera's viewfinder.



Viewing playbacks in the viewfinder

1 Set the POWER switch of this unit to ON, and insert a cassette.

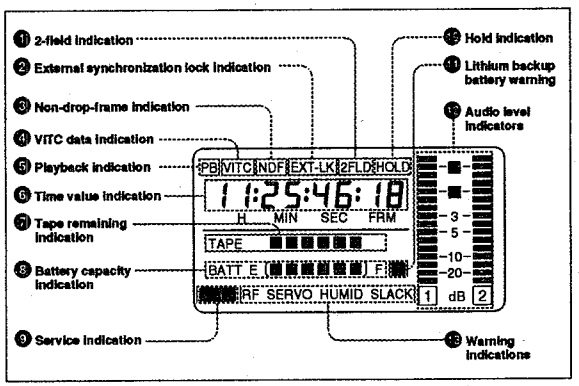
2 Press the PLAY button.
Monochrome playback appears in the camera's viewfinder.
Press the F FWD button for fast forward, and the REW button for rewind.

3 Press the STOP button to stop playback.

To check the color difference signals during playback
Hold down the CTDM button (page 2-7).

Indications in the Display Window

The following indications appear in the display window.



Indications in the display window

❶ 2-field indication

This appears when the internal time code generator has color frame locking disabled.

❷ External synchronization lock indication

This appears when the internal time code generator is locked to an external signal input to the TC IN connector.

❸ Non-drop-frame indication (for NTSC only)

This appears when non-drop-frame mode is selected.

❹ VITC data indication

This appears when VITC data is displayed.

❺ Playback indication

This appears during playback, fast forward, or rewind with the time value indication showing a time code or user bit value.

❻ Time value indication

Depending on the setting of the DISPLAY switch, this shows a counter value, time code value or user bit value.

❼ Tape remaining indication

This shows the remaining tape time during recording or a pause in recording, as shown in the following table.

Indication	Tape time remaining
TAPE ■■■■■	25 minutes or more
TAPE ■■■■■	20 to 25 minutes
TAPE ■■■■	15 to 20 minutes
TAPE ■■■	10 to 15 minutes
TAPE ■■	5 to 10 minutes
TAPE ■	2 to 5 minutes
TAPE ■ (flashing)	0 to 2 minutes
TAPE (flashing)	End of tape
No indication	No cassette loaded

❽ Battery capacity indication

This shows the battery capacity as shown in the following table.

Indication		Battery voltage
BATT E [■■■■■■■	]F	12.5 V or more
BATT E [■■■■■■	]F	12.0 V to 12.5 V
BATT E [■■■■■	]F	11.75 V to 12.0 V
BATT E [■■■■	]F	11.5 V to 11.75 V
BATT E [■■■	]F	11.3 V to 11.5 V
BATT E [■■	]F (flashing) a)	11.25 V to 11.3 V
BATT E [■	]F (flashing)	11.0 V to 11.25 V
BATT E [	]F (flashing)	11.0 V or less

a) Replace the battery pack when this indication appears.

❾ Service indication

This appears during maintenance and special setting operations. It does not appear during normal operation.

❿ Hold indication

This appears when the internal time code generator is stopped.

⓫ Lithium backup battery warning

This appears when the voltage of the internal lithium backup battery (CR2025) is low. If this indication appears, replace the lithium backup battery immediately.

For how to replace the lithium backup battery, see the section "Fitting/Replacing the Lithium Battery" (page 3-13).

⓬ Audio level indicators

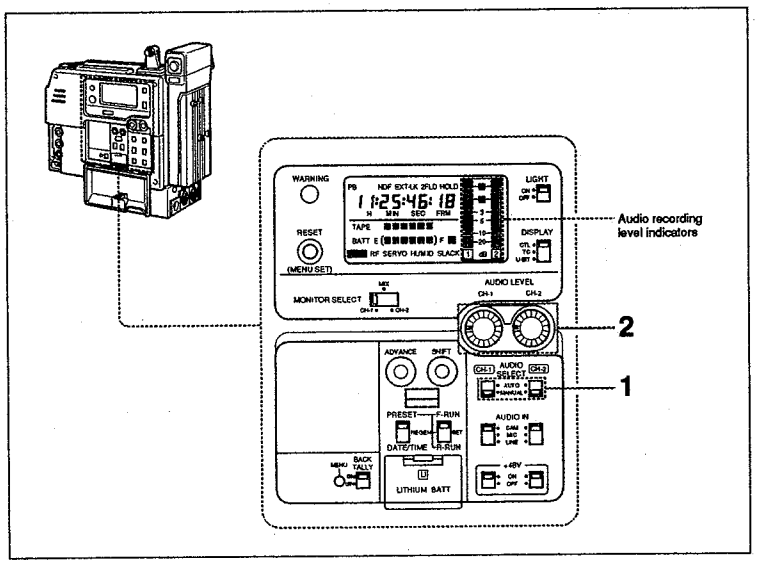
These show the audio recording or playback levels. There are two indications, for channels 1 and 2 respectively.

⓭ Warning indications

These comprise the following indications.
RF: The video heads are clogged, or there is a fault in the recording system.
SERVO: Servo lock is lost.
HUMID: There is condensation on the drum.
SLACK: The tape cannot be wound properly.

Manual Audio Recording Level Adjustment

If the AUDIO SELECT (CH-1/CH-2) switches are in the AUTO position, the audio recording levels are controlled automatically. To control the audio levels manually, carry out the following procedure.
Do this after selecting the input signals for each of the audio channels using the AUDIO IN (CH-1/CH-2) switches.



Adjusting the audio recording levels

1 Set AUDIO SELECT switch for the channel or channels you wish to adjust manually to MANUAL.

2 Watching the audio level indicators in the display window, turn the AUDIO LEVEL knob or knobs for the channel or channels you wish to adjust so that the maximum audio level is about 0 dB.

Recording Time Values

This section describes how to set the resettable counter, the time code value, or the user bits included in the time code signal.

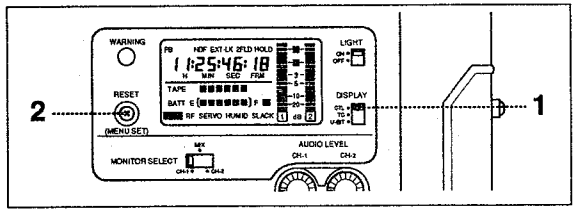
Setting the Counter

When the DISPLAY switch is set to CTL, the counter counts the pulses of the CTL signal on the tape, and displays the count value on the viewfinder screen and in the display window, converted to hours, minutes, seconds and frames. The counter value is not, however, displayed in the viewfinder during playback.
For more information about the time value indication in the viewfinder, refer to the operation manual supplied with the camera.

Note

Depending on the video camera model, the viewfinder time value display function may not be available.

Use the following procedure to set the counter value.



Setting the counter value

1 Set the DISPLAY switch to CTL.
The counter value appears in the display window.

2 Press the RESET/(MENU SET) button.
This resets the value displayed in the viewfinder and display window to "0:00:00:00". The counter then advances as recording proceeds, counting hours, minutes, seconds and frames.

If you rewind the tape after pressing the RESET/(MENU SET) button
The value turns negative, showing a minus sign.

Setting the Time Code Value

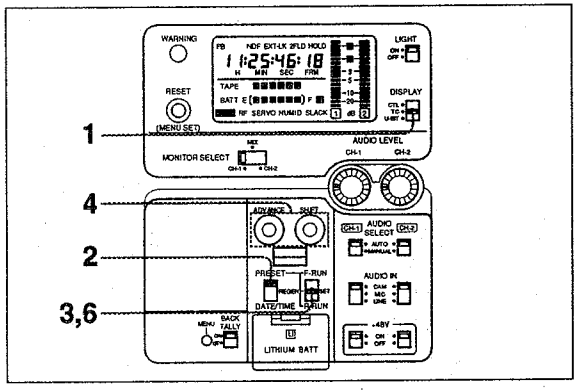
If you are using both time code and user bit values, it is recommended to set the user bit value first.
The time code value can be set anywhere in the range from 00:00:00:00 to 23:59:59:29 (NTSC) or 23:59:59:24 (PAL).

For details of the user bit setting, see the section "Setting the User Bit Value" (page 4-16).

Recording Time Values

Note

This unit uses SMPTE (NTSC)/EBU (PAL) time code for both recording and playback. It is not compatible with other types of time code. Normally, the LTC data and the VITC data recorded in this unit are identical.



Setting the time code value

1 Set the DISPLAY switch to TC.

2 Set TC mode switch 1 to PRESET.

3 Set TC mode switch 2 to SET.

4 Use the SHIFT button to select the digits to set, and the ADVANCE button to change the value, until the required time code value is displayed.

5 If necessary (NTSC only), select the frame mode (DF/NDF).

For details of the frame mode selection, see the section "Selecting drop-frame/non-drop-frame mode (for NTSC only)" (page 4-22).
For an explanation of drop-frame and non-drop-frame modes, see the section "Drop-frame mode (for NTSC only)" (page 4-15).

6 Set TC mode switch 2 to the time code running mode as shown in the following table.

Mode	TC mode switch 2 setting	Effect
Free run: The time code value advances continuously whether recording or not.	F-RUN	The time code value starts advancing immediately.
Record run: The time code value advances only while recording.	R-RUN	The time code value starts advancing when you start recording, and stops between recording sessions.

Resetting the time code value

In step **4** of the procedure above for setting the time code, press the RESET/(MENU SET) button. This resets the displayed time code to "00:00:00:00", and this value flashes.

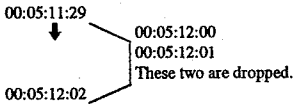
Note

If TC mode switch 1 is set to REGEN or DATE/TIME, it is not possible to reset the time code value.

Drop-frame mode (for NTSC only)

In the NTSC standard, the time code value is based on 30 frames per second, but the exact video frame frequency is in fact 29.97 frames per second. There is thus a 0.1% discrepancy between the time counted at 30 frames per second and the real time, or 18 frames per 10 minutes.
Drop-frame mode corrects for this by skipping two frame counts at the beginning of every minute which is not a multiple of ten.

For example:



In **non-drop-frame mode**, however, no frame counts are omitted, and there is a gradual deviation of the time code time from real time.

Making the time code continuous

In recording-run mode (when TC mode switch 2 is set to R-RUN), recording a number of scenes on the tape normally produces continuous time codes. If, however, you take the cassette out at some point, the time code will no longer be continuous.

1 Set TC mode switch 1 to REGEN.

2 Use the tape transport buttons to play back.

3 Watching the playback on the monitor, find the end point of the previous recording on the tape from which you wish to continue recording, and press the STOP button.
The tape stops.

4 Press the REC REVIEW button of the camera.
This reads the end of the previous recording, and synchronizes the internal time code generator, thus allowing the new time code recorded to follow on consecutively.

Setting the User Bit Value

You can use the user bits to record any identifying code number on the time code track on the tape: this may be the date, time or scene number, for example. User bit values are always expressed as eight-digit hexadecimal values (base 16).

1 Set the DISPLAY switch to U-BIT.

2 Set TC mode switch 1 to PRESET.

3 Set TC mode switch 2 to SET.

4 Use the SHIFT button to select the digits to set, and the ADVANCE button to change the value, until the required user bit value is displayed.

Indications of hexadecimal digits A to F (10 to 15) on the display.

	A	B	C	D	E	F
Display	*A*	*b*	*C*	*d*	*E*	*F*

5 Set TC mode switch 2 to F-RUN (free-run) or R-RUN (record-run).

Resetting the user bit value

In step **4** of the procedure above, press the RESET/(MENU SET) button.
This resets the displayed user bit value to "00 00 00 00".

Setting the time code to the real time clock and calendar

Set TC mode switch 1 to DATE/TIME.
This synchronizes the time code generator to real time (recorded in the user bits) and date (recorded as time code), using the real time clock and calendar set in the VTR menu. Once you set this switch to the DATE/TIME position, it is not possible to retrieve the previous value (user bits and time code) in the time code generator.

For how to set the real time clock and calendar, see the section "Setting the Real Time Clock and Calendar" (page 4-21).

Recording the real time in the VITC user bits

Set VTR menu 209 to ON.
The real time is recorded in the VITC user bits.
You can carry out this operation even when TC mode switch 1 is set to DATE/TIME.

For how to set VTR menu 209, see the section "Setting the Real Time Recording Function (for the VITC User Bits)" (page 4-23).
For how to set the real time, see the section "Setting the Real Time Clock and Calendar" (page 4-21).

Displaying the VITC User Bits

When the DISPLAY switch is set to U-BIT, the LTC user bits are displayed in the time value indication in the display window. It is also possible, however, to display the information recorded in the VITC user bits.
To display the VITC user bits, set the TC mode switch 2 to R-RUN or F-RUN and hold down the SHIFT button while the unit is recording, paused during recording, or completely stopped.
While the SHIFT button is held down, the LTC data displayed in the display window is replaced by the information recorded in the VITC user bits.
The LTC and VITC time code values recorded in this unit are identical.

Displaying the real time recorded in the VITC user bits

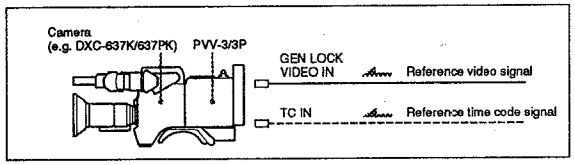
When you record the real time in the VITC user bits *(page 4-16)*, you can display the real time in the display window.
To display the real time recorded in the VITC user bits, set VTR menu 209 to ON, then carry out the procedure described in the above section "Displaying the VITC User Bits".
While the SHIFT button is held down, the real time recorded in the VITC user bits appears in the display window.

External Synchronization

This section describes the procedures involved in external synchronization of the camcorder, when using two or more camcorders synchronized for operation with a special effects unit, for example.

Synchronizing video and time code signals with an external signal

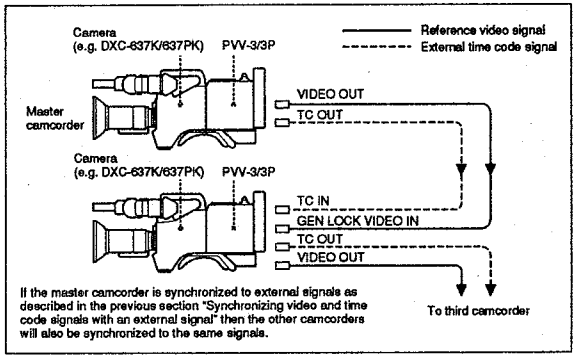
Connect the external reference video and time code signals as shown in the following figure.



Connecting external reference video and time code signals

External Synchronization

Synchronizing two or more camcorders


Camera
(e.g. DXC-637K/637PK)
PVV-3/3P
Reference video signal
External time code signal
Master camcorder
VIDEO OUT
TC OUT
Camera
(e.g. DXC-637K/637PK)
PVV-3/3P
TC IN
GEN LOCK VIDEO IN
TC OUT
VIDEO OUT
If the master camcorder is synchronized to external signals as described in the previous section "Synchronizing video and time code signals with an external signal" then the other camcorders will also be synchronized to the same signals.
To third camcorder

Connections for synchronizing two or more camcorders

Phase alignment of the time code signals

1 Turn this unit and the camera on.

2 Set TC mode switch 1 to PRESET and TC mode switch 2 to F-RUN.

3 Set the DISPLAY switch to TC.

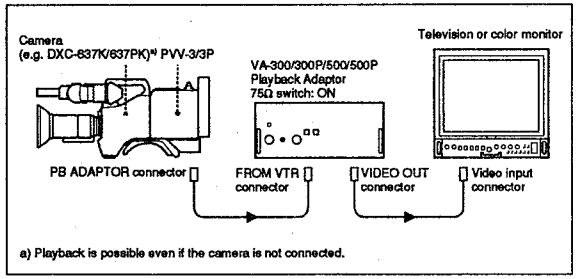
In this state, when you supply external video and time code reference signals, the internal time code generator locks on to the external time code signal. When the indication EXT-LK appears in the display window, the internal time code is synchronized with the external time code, and you can disconnect the external time code signal. Within the limits of accuracy, the internal time code generator will continue advancing the time code value in synchronization with the external equipment.

Notes

- After synchronizing with the external signal, wait a few seconds while the internal synchronizing circuits stabilize before beginning recording.
- The external synchronization affects only the time code values. It is not possible to synchronize the user bit values.
- When the time code generator is operating in F-RUN mode, turning the POWER switch of this unit or the camera off and on may degrade the phase alignment accuracy.
- If you change the TC mode switch settings made in the above procedure, the time code stops advancing. As a result, the time code synchronization is lost and the indication EXT-LK in the display window disappears.
- Color frame locking is not possible while the internal time code generator is locked on to the external time code signal.

Color Playback

To monitor color playback video with this unit, connect a VA-300/300P/500/500P Playback Adaptor (not supplied) to the unit, and a television or color monitor to the VA-300/300P/500/500P as shown in the following figure, and press the PLAY button.



Color playback

Notes

- If you use the recording review function with the playback adaptor connected, the output signals to the playback adaptor are the same as the output signals to the viewfinder video and audio monitor.
- The playback adaptor output signals switch to E-E mode video and audio when the unit begins recording, is paused during recording, or is completely stopped.
- When using a VA-500/500P for playback, ensure that the switches below the AUDIO LEVEL CH-3 and CH-4 adjustment knobs on the VA-500/500P are off.
- When using a playback adaptor with a video monitor or other monitoring equipment connected to the VIDEO OUT connector of this unit, set the 75Ω switch of the playback adaptor to OFF.

Using the VTR Menu

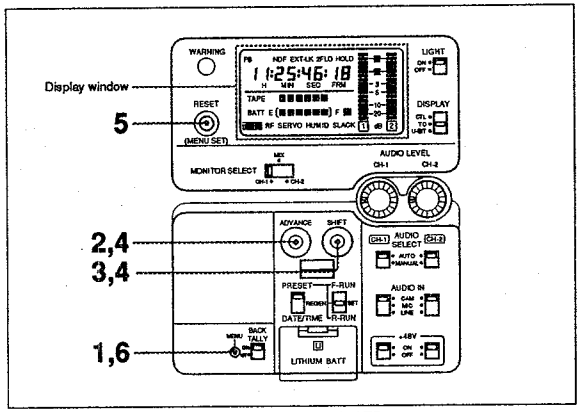
The VTR menu provides the following functions.

Function	Menu number	Ref page
Real time clock and calender settings	101	4-21
Cumulative hours counts: • Head drum operating hours • Tape transport operation hours • Operating hours (total with power on)	201	4-22
NTSC drop-frame/non-drop-frame mode	204	4-22
Anton Bauer Magnum battery capacity indication setting	206	—a)
Standby period setting	207	4-22
VITC insertion line setting	208	4-23
Real time recording function setting (for VITC user bits)	209	4-23

a) Normally, leave menu 206 set to OFF.

(In the following description, an underscore indicates a portion of the display which is flashing.)

Basic procedure for settings in the VTR menu



Basic procedure for settings in the VTR menu

1 Press the MENU button.
The "DIAG" indication appears in the display window, and the time value indication shows "101 1994". ("1994" is the factory default.)

2 Press the ADVANCE button to change the leading three-digit number in the time value indication to the required menu number.

3 Press the SHIFT button.
The current setting appears. Part of the setting flashes to indicate that it can currently be changed.

4 Use the SHIFT button to switch to the next portion to set, and use the ADVANCE button to change the value of the current flashing portion.

5 Press the RESET/(MENU SET) button.
This stores the settings, and once again displays the menu number flashing.

6 Press the MENU button.
The display window returns to the state before entering the VTR menu.

Setting the Real Time Clock and Calendar

1 Select menu number 101, and press the SHIFT button.
The current date setting appears as an eight-digit number **in the setting mode format (yyyymmdd).** For example, "19940825" is August 25, 1994.

Note

It is not possible to change the first two digits of the year.

2 Use the SHIFT and ADVANCE buttons to obtain today's date.

Ending the setting
Press the RESET/(MENU SET) button, then the MENU button, to exit the VTR menu.
The date set appears in the mmddyyyy format for NTSC versions (e.g. August 25, 1994 is displayed as "08251994") or in the ddmmyyyy format for PAL versions (e.g. August 25, 1994 is displayed as "25081994").

Continuing to set the time
Proceed to step **3**.

3 With the day display flashing in the setting mode format, press the SHIFT button.
The current time setting appears as a six-digit number, in 24-hour representation (hhmmss). For example,"221505" is 22:15 and 5 seconds.

4 Use the SHIFT and ADVANCE buttons to obtain the current time.

5 Press the RESET/(MENU SET) button, then the MENU button.
This exits the VTR menu.
The real time clock starts advancing from the setting at the point when you press the RESET/(MENU SET) button.
The date set appears in the mmddyyyy format for NTSC versions or in the ddmmyyyy format for PAL versions as described in step **2** above.

Displaying the Head Drum/Tape Transport/Total Operation Hours

1 Select menu number 201, and press the SHIFT button.
Pressing the SHIFT button cycles through the following displays:
- Head drum operating hours (e.g. "A 0492Hr")
- Tape transport operation hours (e.g. "b 0720Hr")
- Total operating hours (e.g. "C 0835Hr")
- Menu number indication (e.g. "201 0492")

2 After checking the displays, press the SHIFT or RESET/(MENU SET) button.
The menu number appears again.

3 Press the MENU button.
This exits the VTR menu.

Selecting Drop-Frame/Non-Drop-Frame Mode (for NTSC Only)

1 Select menu number 204.
The current setting appears beside the menu number (e.g. "204 dF ").
dF: drop-frame mode (factory default)
ndF: non-drop-frame mode

2 Press the SHIFT button to make the frame mode indication flash (e.g. "204 dF "), then press the ADVANCE button.
This toggles the mode between "dF" and "ndF".

3 Press the RESET/(MENU SET) button, then the MENU button.
This exits the VTR menu.
The new setting is saved when you press the RESET/(MENU SET) button.

Setting the Standby Period

The standby period is the maximum length of time (in minutes) that the unit will remain in the paused state before automatically removing the tape tension.

1 Select menu number 207.
The current setting appears beside the menu number (e.g. "207 08 ").

2 Press the SHIFT button to make the minute count flash (e.g. "207 08 "), then press the ADVANCE button.
Pressing the ADVANCE button cycles through the possible settings:
08 (factory default) → 01 → 03 → 05

3 Press the RESET/(MENU SET) button, then the MENU button, to exit the VTR menu.
The new setting is saved when you press the RESET/(MENU SET) button.

Setting the VITC Insertion Lines

1 Select menu number 208.
The current setting appears beside the menu number (e.g., when lines 16 and 18 are currently set, "208 1618").

2 Press the SHIFT button to make the line number to be changed flash (e.g. "208 1618"), then press the ADVANCE button until the desired line number is displayed.
Pressing the ADVANCE button cycles through the possible settings in the range of 12-19 (NTSC)/9-22 (PAL).
If you wish to change the other VITC insertion line, too, repeat this step. You may set any two VITC insertion lines which are not adjacent to each other.

3 Press the RESET/(MENU SET) button, then the MENU button.
This exits the VTR menu.
The new setting is saved when you press the RESET/(MENU SET) button.

Setting the Real Time Recording Function (for the VITC User Bits)

The real time recording function allows you to record the real time on the VITC user bits.

1 Select menu number 209.
The current setting appears beside the menu number (e.g. "209 OFF ").

2 Press the SHIFT button to make the current setting flash (e.g. "209 OFF "), then press the ADVANCE button to display the desired setting.
Pressing the ADVANCE button toggles the setting between ON and OFF.

3 Press the RESET/(MENU SET) button, then the MENU button.
This exits the VTR menu.
The new setting is saved when you press the RESET/(MENU SET) button.

Chapter 5
Maintenance

Warning System 5-2
Troubleshooting 5-3
Care of the Unit 5-4

Warning System

When the unit is powered on, or if a fault occurs during operation, a warning is given in the following ways:

- By the warning indicators in the viewfinder. (Depending on the video camera model, this feature may not be available.)
- By warning indications in the display window.
- By means of the WARNING indicator together with a warning tone from the speaker or earphone.

You can adjust the volume of the warning tone with the ALARM knob. When this knob is turned to the minimum position, there is no sound output at all.

Operation warnings and action to be taken

VTR (PVV-3/3P)				Camera					
Display window		WARNING indicator	Warning tone	Viewfinder indicator			Problem	Machine status	What to do
Warning indication	Rate (Flashing/ Continuous)	☼ Cycle ready ✱ 1 flash/s ✱✱ 4 flashes/s	Continuous tone with 1 beep/s or 4 beeps/s	☼ CAUTION ✱ 1 flash/s ✱✱ 4 flashes/s	BATT Continuous 1 flash/s 4 flashes/s				
RF	Continuous[a]	✱✱ [a]	[a]	✱✱ [a]			Video head gaps clogged or problem in recording circuit.	After detecting head clogging, recording continues but quality is poor.	Clean the heads. If the problem persists, power off, and consult your Sony service representative.
SERVO	Continuous[a]	✱✱ [a]	[a]	✱✱ [a]			Servo lock lost.	Recording continues but quality is poor. The warning indicator may sometimes flash for a short time at the beginning of recording.	Power off, and consult your Sony service representative.
HUMID	Continuous	☼		✱✱			Condensation on head drum.	The unit stops, and all operations are inhibited except eject.	Without powering off, wait until the HUMID indication disappears.
SLACK	Continuous	✱✱		✱✱			The tape cannot be wound properly.	Operation stops.	Consult your Sony service representative
TAPE	Flashing[a] (1 flash/s)	✱ [a]	[a]	✱ [a]			Close to the end of tape.	Operation continuous.	Replace the cassette as soon as possible.
	Flashing (4 flashes/s)	☼		✱✱			End of tape.	Recording, playback or fast forward stops.	Replace the cassette or rewind.
BATT	Flashing (1 flash/s)	✱		✱ [b]	✱		Battery almost exhausted.	Operation continues.	Replace the battery as soon as possible.
	Flashing (4 flashes/s)	☼	[a]	✱✱	☼		Battery exhausted.	Operation stops.	Replace the battery.

a) During recording or a recording paused state ("standby on") only.

b) Except during playback, fast forward, rewinding and recording review.

For details of error messages displayed in the viewfinder, refer to the operation manual supplied with the camera.

Troubleshooting

You can use this chart to establish possible causes of an apparent problem; always double-check before sending the unit for repair. If a problem persists, contact your Sony service representative.

Troubleshooting chart

Symptoms	Causes	Remedy
The unit does not power on when you switch the POWER switch on.	• There is no battery pack loaded. • The battery pack has reached the end of its usable life. • The AC power adaptor is not connected, or it is not turned on.	• Load a battery pack *(page 3-10)*. • Replace the battery pack with a fully charged one *(page 3-10)*. • Connect the AC power adaptor, or turn it on. *(page 3-12)*.
The tape transport does not operate when you press either VTR button.	• The POWER switch of the camera or VTR is turned off. • The VTR has reached the end of tape. • The cassette has the record-inhibit plug pushed in.	• Turn the POWER switches of the camera and VTR on *(page 2-2)*. • Rewind the tape, or load a new cassette *(page 4-3)*. • Either load a new cassette, or pull the record-inhibit plug out *(page 4-2)*.
The tape transport does not operate when you press any tape transport button.	The VTR has reached the end of tape.	Either rewind the tape, or load a new cassette *(page 4-3)*.
The video and audio E-E output is not present.	The POWER switch is turned off.	Turn the POWER switch on *(page 2-2)*.
The power supply cuts while operating.	The battery pack is exhausted.	Replace the battery pack with a fully charged one *(page 3-10)*.
The battery goes dead very quickly.	• The operating temperature is very low. • The battery pack is inadequately charged.	Recharge the battery pack, or replace with a new fully charged battery pack *(page 3-10)*.
It is not possible to eject the cassette.	• The battery pack is exhausted. • The POWER switch is turned off.	• Replace the battery pack with a fully charged one *(page 3-10)*. • Turn the POWER switch on *(page 2-2)*.
• The playback picture quality is poor. • The playback picture does not appear.	The video heads are dirty.	Clear the video heads using a BCT-5CLN cleaning cassette *(page 5-4)*.
All controls except the EJECT button are disabled.	There is condensation on the head drum.	Remove the cassette, power off, and wait until the condensation has evaporated *(page 3-3)*.
Audio recording is not possible.	The AUDIO LEVEL (CH-1/CH-2) knobs are set to the minimum level.	Adjust the setting of the AUDIO LEVEL (CH-1/CH-2) knobs *(page 4-12)*.
The recorded sound is distorted.	The audio level is too high.	Adjust the setting of the AUDIO LEVEL (CH-1/CH-2) knobs, and record again *(page 4-12)*.
The recorded sound has a high noise level.	The audio level is too low.	Adjust the setting of the AUDIO LEVEL (CH-1/CH-2) knobs, and record again *(page 4-12)*.

Care of the Unit

Cleaning the video heads

Always use the special-purpose Sony BCT-5CLN Cleaning Cassette for cleaning the audio and video heads. Follow the instructions with the cleaning cassette carefully, as **inappropriate use of the cleaning cassette can damage the heads.**

Replacing the video heads

If cleaning the video heads fails to restore picture quality, the heads may be due for replacement.
Keep a check of the hours of head drum operation: with normal use, **the heads should need replacing after about 500 hours of use.**
When the heads need replacement, contact your supplier or Sony service representative.

You can check the head drum operating hours using the VTR menu. For details see the section "Using the VTR Menu" (page 4-20).

Replacing other parts

For replacement of all parts other than the video heads, contact your supplier or Sony service representative.

Appendix

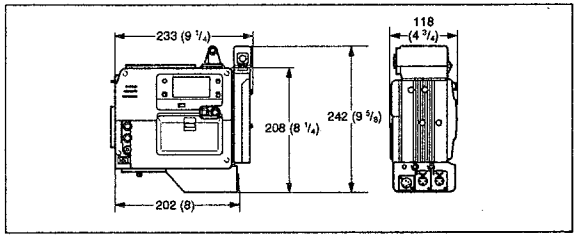
Specifications 1-3

Specifications

General

Power supply voltage	12 V DC $^{+5}_{-1}$ V AC-550/550CE AC Adaptor is usable.
Power consumption	10 W
Continuous recording time	About 60 minutes (using NP-1B Battery Pack and with a DXC-637K/637PK Video Camera connected)
Operating temperature	0 °C to 40 °C (32 °F to 104 °F)
Operating humidity	25% to 85% (cannot be used when condensation present)
Storage temperature	–20 °C to +60 °C (–4 °F to 140°F)
Mass	About 2.8 kg (6 lb 2 oz) (About 3.7 kg (8 lb 2 oz) including NP-1B Battery Pack, and BCT-30MA Cassette Tape)

External dimensions in mm (inches)



Tape transport system

Tape speed	NTSC: Approximately 118.6 mm/s PAL: Approximately 101.5 mm/s
Recording/playback time	Using BCT-30MA/UVWT-30MA NTSC: More than 30 minutes PAL: More than 35 minutes
Fast forward time	Maximum 7.5 minutes (using BCT-30MA/UVWT-30MA)
Rewind time	Maximum 5.5 minutes (using BCT-30MA/UVWT-30MA)
Cassette tapes used	Betacam SP 1/2-inch metal tape BCT-5MA/10MA/20MA/30MA, UVWT-10MA/20MA/30MA or equivalent

Video system

Recording system: Luminance: Frequency modulation
Color difference: Time division time compression FM

Band-width	Luminance	NTSC: 30 Hz to 4.5 MHz $^{+0.5}_{-4.0}$ dB
		PAL: 25 Hz to 5.5 MHz $^{+0.5}_{-4.0}$ dB
	Color difference	NTSC: 30 Hz to 1.5 MHz $^{+0.5}_{-3.0}$ dB
		PAL: 25 Hz to 2.0 MHz $^{+0.5}_{-3.0}$ dB
S/N ratio	Luminance	NTSC: At least 51 dB
		PAL: At least 48 dB
	Color difference	At least 48 dB
K factor (ET pulse)		2% or less
Y/C delay		20 ns or less

Audio system

Recording system: Fixed heads

Frequency characteristic	50 Hz to 15 kHz $^{+1.5}_{-3.0}$ dB
S/N ratio (at 3% distortion level for NTSC) (flattened to peak level + weighted CCIR 468-3 for PAL)	NTSC: 72 dB or more, PAL: 62 dB or more
Distortion (THD) (1 kHz reference level)	1.5% or less
Wow and flutter	0.15% rms or less

a) Peak level= +8 dB above operational level

Inputs and outputs

Input connectors

CH-1(+48V) / CH-2(+48V) (XLR 3-pin, ×2)
–60 dBu, 3 kΩ / +4 dB, 10 kΩ (0 dBu: 0.775 Vrms)
GEN LOCK VIDEO IN (BNC)
1.0 Vp-p, 75 Ω
TC IN (BNC) 0.5 to 18 Vp-p, 10 kΩ
DC IN (XLR 4-pin, male)

Camera connector

Luminance: 1.0 Vp-p, 1 kΩ
Chroma (B–Y, R–Y): 0.7 (NTSC)/0.7(PAL) Vp-p, 1 kΩ

Specifications

Output connectors
VIDEO OUT (BNC) 1.0 Vp-p, 75 Ω
TC OUT (BNC) 1.0 Vp-p, 75 Ω
EAR (stereo mini-jack) –∞ to –20 dBu variable, 8 Ω
PB ADAPTOR (round, 20-pin)

Remote control connector (for RM-81)
REMOTE (mini-jack) Recording trigger input, tally LED output

Supplied accessories

Shoulder strap (1)
Grip (1)
Lithium button cell (type CR2025) (1)
M4 × 6 screws (2)
M4 × 12 screws (2)
Operation manual (1)

Design and specifications are subject to change without notice.

Related Equipment

Color video cameras
DXC-637K/637L/637H/637PK/637PL/637PH
DXC-537AK/537AL/537AH/537APK/537APL/537APH
DXC-327AK/327AL/327AH/327APK/327APL/327APH

Battery packs
NP-1B, BP-90A/L60/L90

Battery chargers
BC-1WB/1WBCE/410/410CE/L100/L100CE

Battery adaptors
DC-520 (holds two NP-1B Battery Packs)
BKW-L601 (for BP-L60/L90)

Battery case
DC-500 (for BP-90A)

AC adaptors
AC-550/550CE, CMA-8A/8ACE

Earphone
ME-20B

Wireless microphones
WRT-810A/830A

UHF portable tuner
WRR-810/860

Playback adaptors
VA-300/300P/500/500P

Remote control unit
RM-81

Carrying case
LC-421

SECTION 2
SERVICE OVERVIEW

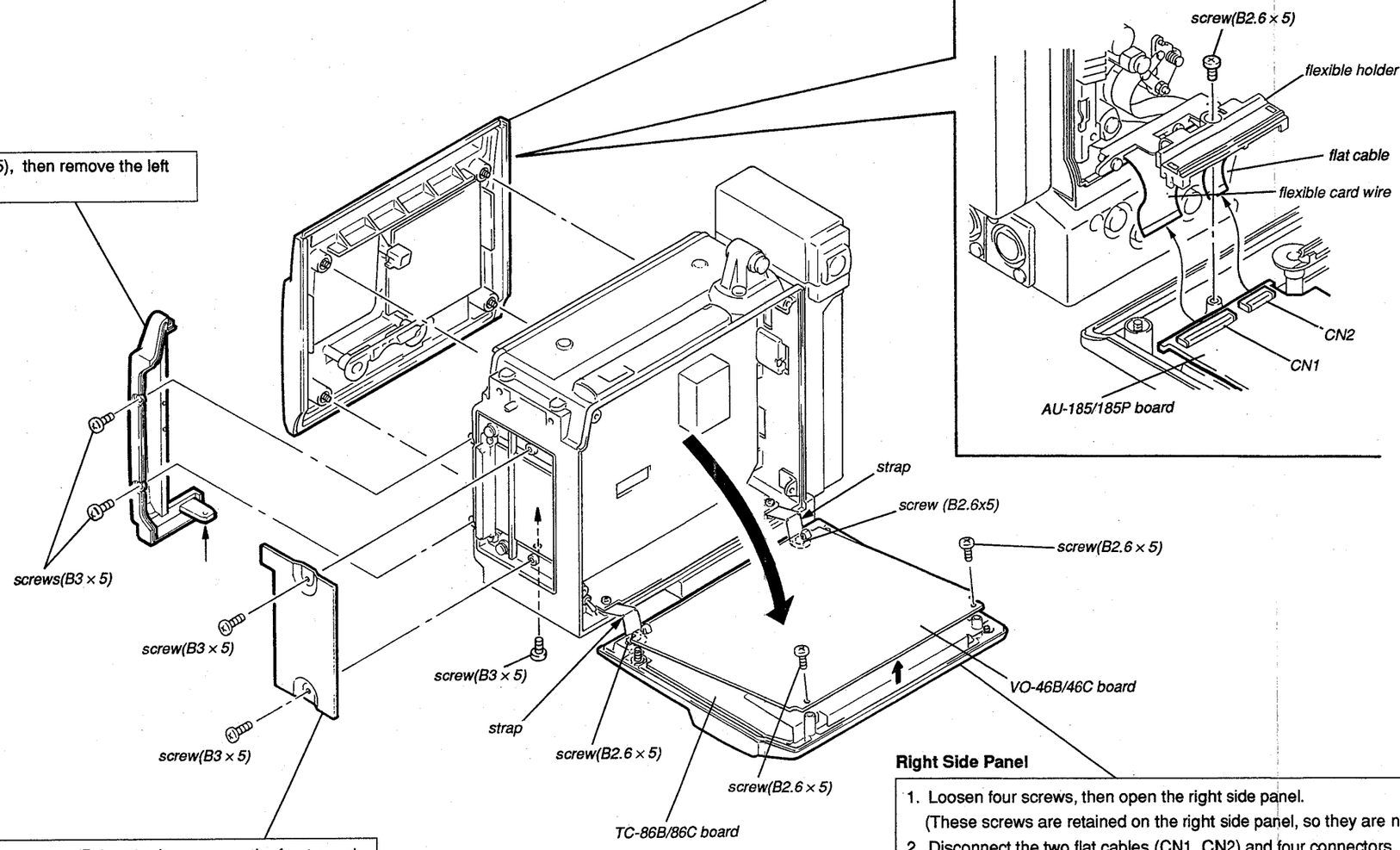
2-1. REMOVAL OF THE CABINET

Cassette-up Compartment Lid

1. Loosen four screws, then open the cassette-up compartment lid.
   (These screws are retained on the cassette-up compartment lid, so they are not out of it.)
2. Remove the screw (B2.6 × 5) of the flexible holder shown in the figure.
3. Disconnect the flexible card wire (CN1), and the flat cable (CN2) of the AU-185/185P board, then remove the cassette-up compartment lid.

Left Side Panel

1. Remove three screws (B 3 × 5), then remove the left side panel.



Front Panel

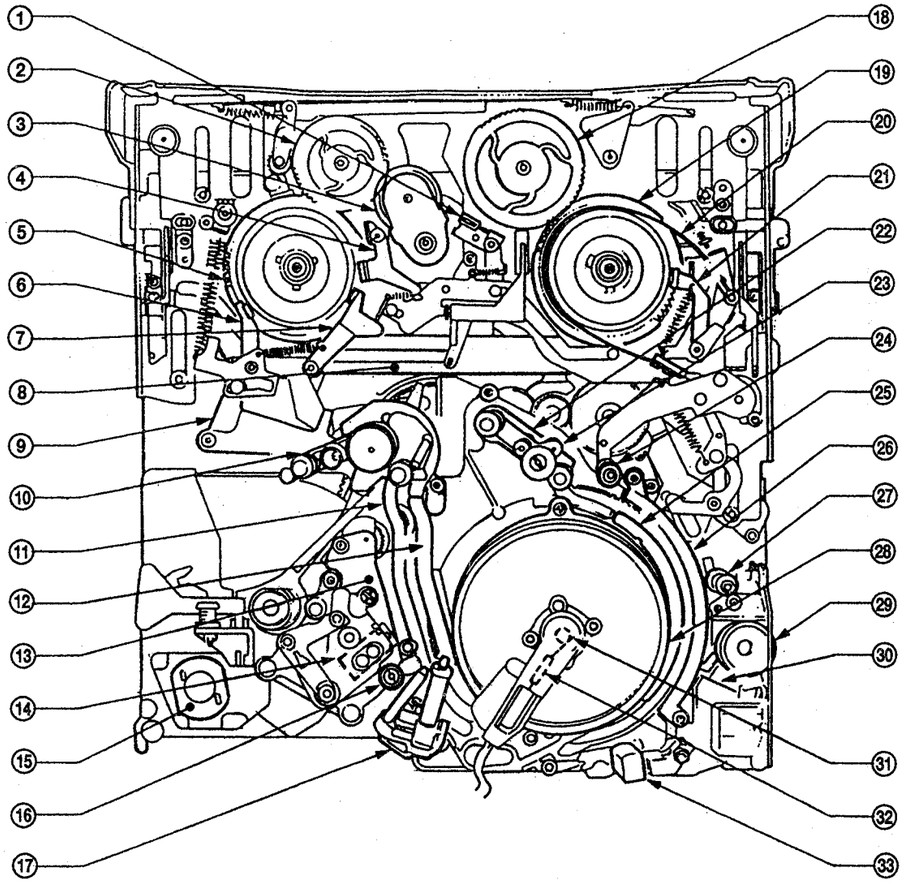
1. Remove two screws (B 3 × 5), then remove the front panel.

Right Side Panel

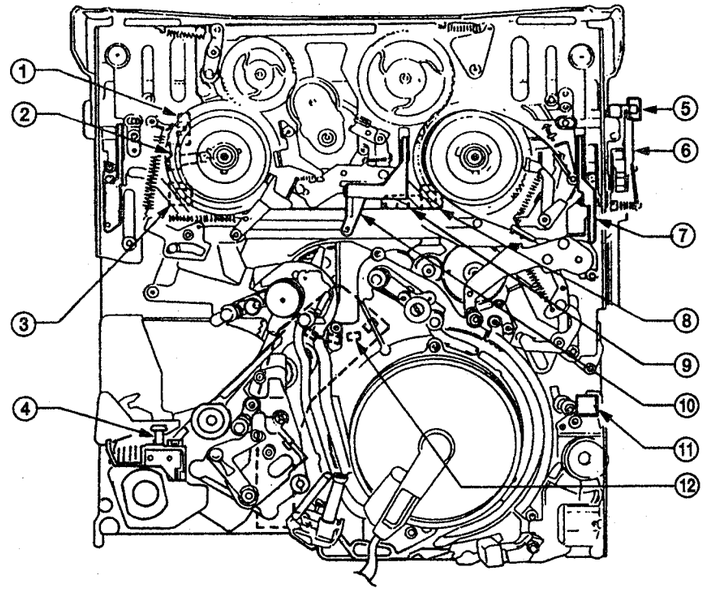
1. Loosen four screws, then open the right side panel.
   (These screws are retained on the right side panel, so they are not out of it.)
2. Disconnect the two flat cables (CN1, CN2) and four connectors (CN3, CN4, CN5, CN6) of the VO-46B/46C board. (refer to section 2-11-10.)
3. Remove two screws (B2.6 × 5) of the VO-46B/46C board, then open the board. (refer to section 2-11-10.)
4. Disconnect the two flat cables (CN1, CN2), and five connectors (CN3, CN701B, CN101W, CN201R, CN702) of the TC-86B/86C board. (refer to section 2-11-10.)
5. Remove each screw (B2.6 × 5) of the strap, then remove the right side panel.

2-2. LOCATION OF MAIN PARTS

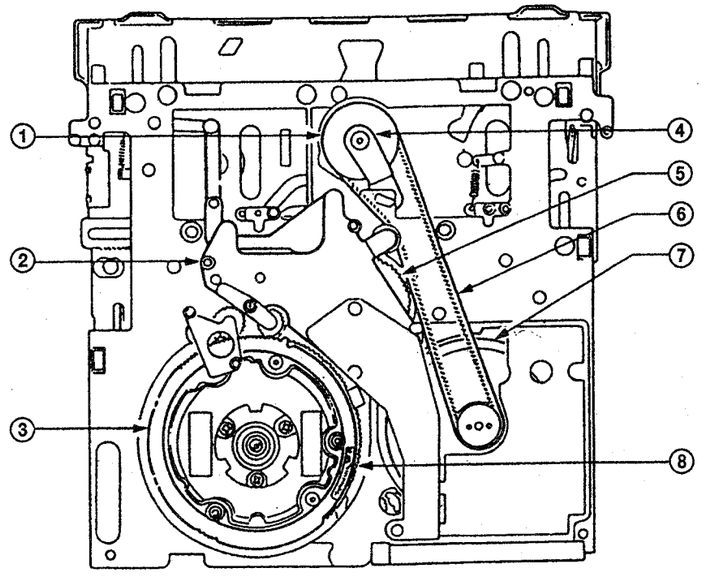
2-2-1. Location of the Mechanical Main Parts / Components



① Supply Side Main Brake
② Take-up Side Idler
③ Gear
④ Take-up Side Main Brake
⑤ Take-up Side Reel Table
⑥ Take-up Side Sub Soft Brake
⑦ Take-up Side Soft Brake
⑧ Reel Slider
⑨ Main Pinch Arm
⑩ Sub-pinch Arm
⑪ Take-up Side Rail (O)
⑫ Take-up Side Rail (I)
⑬ Threading Gear
⑭ Audio/TC Head
⑮ Threading Motor
⑯ IR-11
⑰ Take-up Side Sub-base
⑱ Supply Side Idler
⑲ Supply Side Reel Table
⑳ Tension Regulator Band
㉑ Supply Side Soft Brake
㉒ Supply Side Base
㉓ Supply Side Sub-base
㉔ Tension Regulator Guide
㉕ Supply Side Rail (O)
㉖ Supply Side Rail (I)
㉗ TG-1
㉘ Drum
㉙ IR-1
㉚ Full Erase Head
㉛ Slip Ring
㉜ Brush
㉝ CTL Head



① Cassette Detection Sensor
② Cassette Detection Shutter
③ Take-up Reel Rotation Detector
④ Tape End Sensor
⑤ Tape Beginning Sensor
⑥ Cassette-up Compartment Lock switch
⑦ Lock Arm
⑧ Miss-REC Lever B
⑨ Supply Reel Rotation Detector
⑩ Metal/Oxide Selector
⑪ Metal Detection Lever
⑫ Mechanical Function Cam Sensor



① Relay Pulley
② Cam Gear Base
③ Threading Ring T
④ Gear Base
⑤ Function Cam
⑥ Timing Belt
⑦ Capstan
⑧ Threading Ring S

Function of the Sensors

- Miss-REC Lever B (for metal particle tape)
  This is a record-proof switch for metal particle tape.

- Metal/Oxide Selector
  This switch detects whether an oxide tape or a metal particle tape is being used.

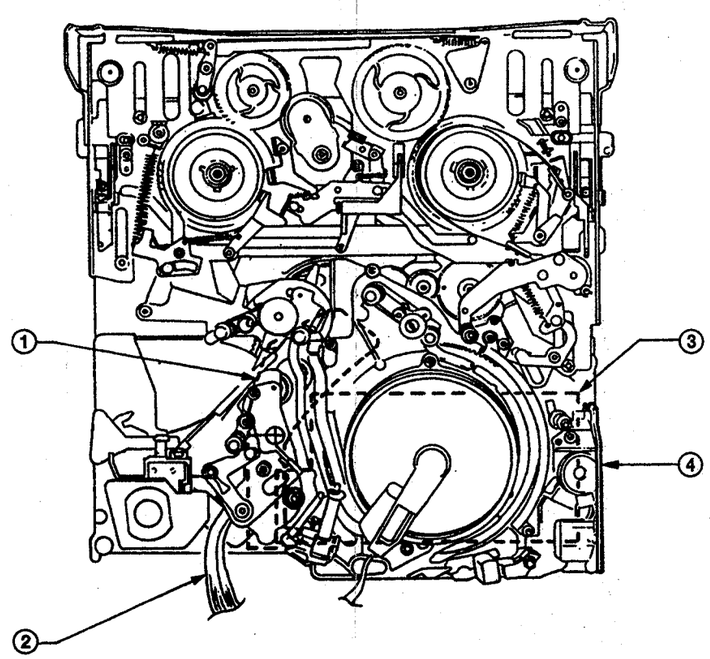
- Cassette Detection Sensor
  This switch detects whether a cassette is being inserted.

- Cassette-up Compartment Lock Switch
  This switch detects that the Cassette-up Compartment is locked.
  When the Cassette-up Compartment is locked, threading is perfomed.
  When EJECT mode, the Cassette-up Compartment is opened, the EJECT mode is finished.

- Mechanical Function Cam Sensor
  (Cam Position Sensor)
  This sensor detects whether the Cam is moved to the designed position or not.

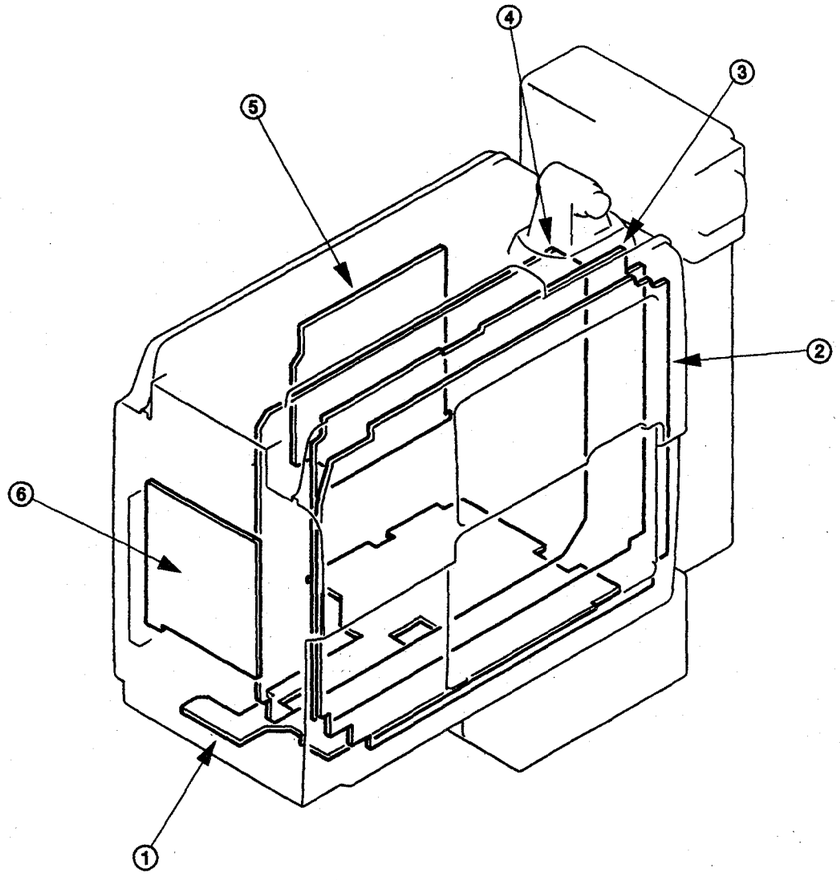
2-2-2. Location of the Printed Circuit Boards

Mechanical Deck



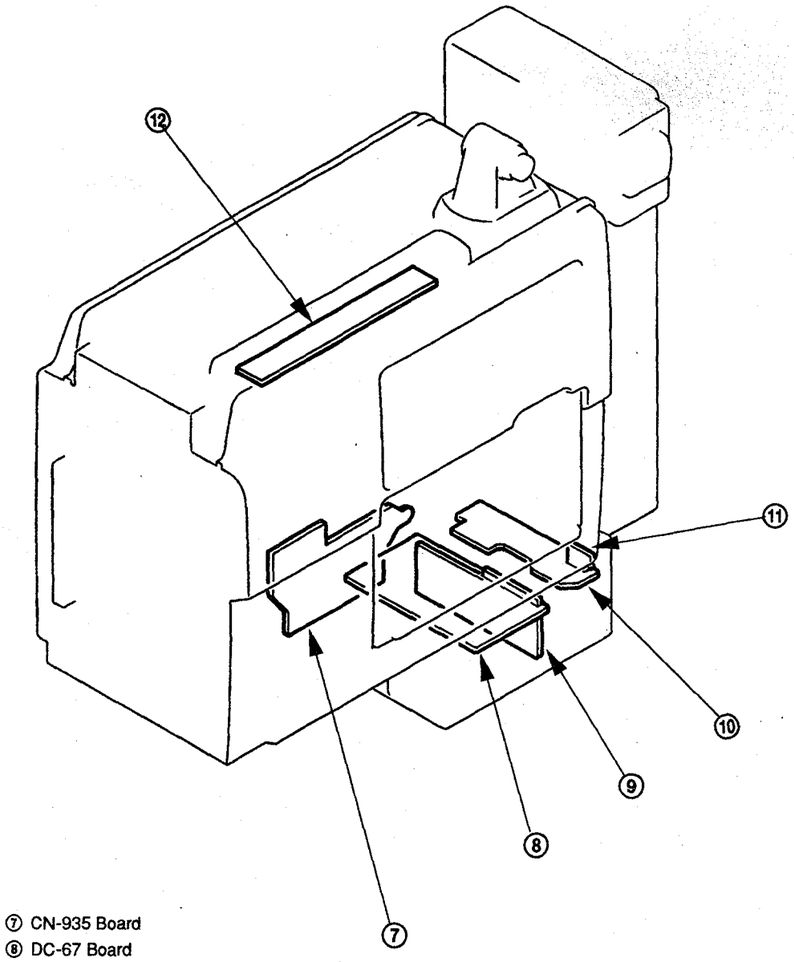
① SR-55 Board
② FL-160 Board
③ DR-254 Board
④ FE-18 Board

Main Chassis (1)



① MB-552 Board
② TC-86B (UC)/TC-86C (EK) Board
③ VO-46B (UC)/VO-46C (EK) Board
④ SS-57B (UC)/SS-57C (EK) Board
⑤ AU-185 (UC)/AU-185P (EK) Board
⑥ CN-983 Board

Main Chassis (2)



⑦ CN-935 Board
⑧ DC-67 Board
⑨ DC-68 Board
⑩ CN-1123 Board
⑪ LED-214 Board
⑫ KY-285 Board

INDEX

- **Main Chassis**

AU-185 (UC) / AU-185P (EK) Board ..... ⑤
CN-935 Board ..... ⑦
CN-983 Board ..... ⑥
CN-1123 Board ..... ⑩
DC-67 Board ..... ⑧
DC-68 Board ..... ⑨
KY-285 Board ..... ⑫
LED-214 Board ..... ⑪
MB-552 Board ..... ①
SS-57B (UC) / SS-57C (EK) Board .... ④
TC-86B (UC) / TC-86C (EK) Board .... ②
VO-46B (UC) / VO-46C (EK) Board ... ③

- **Mechanical Deck**

DR-254 Board ..... ③
FE-18 Board ..... ④
FL-160 Board ..... ②
SR-55 Board ..... ①

2-3. PRINTED CIRCUIT BOARD

Circuit information is provided below.

System	Circuit Board	Circuit Function
VIDEO	VO-46B/ VO-46C	RF AMP MOD/DE MOD CTDM Y/C REC DRIVER VITC MIX
AUDIO	AU-185/ AU-185P	BIAS OSC REC/PB AMP
	FE-18	ERASE/OSC TAPE END SENSOR CTL/HUMID CONNECTION
SYSCON SERVO	KY-285	FUNCTION KEY
	SR-55	MECHANICAL POSITION SENSOR
	SS-57B/ SS-57C	SERVO & SYSTEM CONTROL CASSETTE SENSOR LTC REC/PB AMP CTL REC/PB AMP REEL FG SENSOR/AMP MOTOR DRIVER
POWER	DC-67 (inc. DC-68)	DC-DC CONVERTER
Others	CN-935	VIDEO/TC CONNECTOR PB ADAPTOR
	CN-983	50P CONNECTOR
	CN-1123 (inc. LED-214)	EARPHONE/REMOTE JACK REAR TALLY LAMP
	DR-254	DRUM MOTOR DRIVER DRUM FG/PG AMP
	MB-552	MOTHER BOARD
	TC-86B/ TC-86C	TC GENERATOR/READER TC SWITCH AUDIO IN/OUT AMP AUDIO NOISE REDUCTION

2-4. PRECAUTIONS ON TIGHTENING THE SCREWS

(1) The Fixing Screws to the Chassis

The PVV-3/3P is compact and lightweight, so many M1.4×2.5 screws (1.4 mm dia.) and M2 × 5 and M2 × 8 screws (2 mm dia.) are employed.
An aluminum diecast chassis is employed. Pay careful attention to the tightening torque when tightening the screws. Stronger torque may damage the chassis screws.
The torque screwdriver and bits below are provided.

	SONY Parts No.
Torque driver	J-6325-400-A
Bit for M1.4	J-6325-110-A
Bit for M2	J-6325-380-A
Screw M1.4 torque:	0.09 ± 0.01 N.m (0.9 ± 0.1 kg.cm)
Screw M2 torque:	0.3 ± 0.05 N.m (3.0 ± 0.5 kg.cm)

The above torque driver can be used for both screws M1.4 and M2.

If you damage the chassis screws when tightening screw M1.4, use the following screw:

	SONY Parts No.
M1.7 × 3	2-641-348-02
or	
M1.4 × 5	3-729-013-71

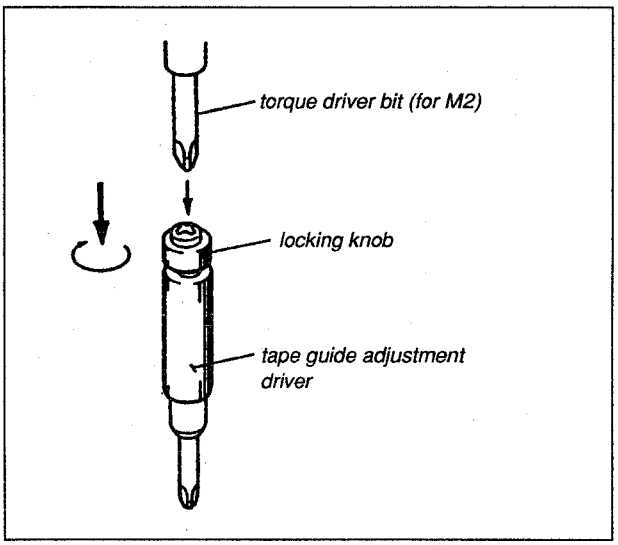
To distinguish the above screw from screw M1.4, mark the screw top in red. Apply the locking compound at the same time.

(2) The Locking Screw of the Tape Guide Upper Flange

When the height adjustment of the tape guide is performed in the Tape Run Alignment, use the tape guide adjustment driver (SONY Parts No.: J-6321-500-A) prepared for the maintenance tool.
After the height adjustment of the tape guide is completed, tighten the locking screw of the tape guide upper flange with the torque driver by the following procedures.

	SONY Parts No.
Torque Driver	J-6325-400-A
Torque Driver	J-6325-400-A
Torque Driver Bit (For M2)	J-6325-380-A
Tightening Torque	0.09 ± 0.01 N.m (0.9 ± 0.1 kg.cm)

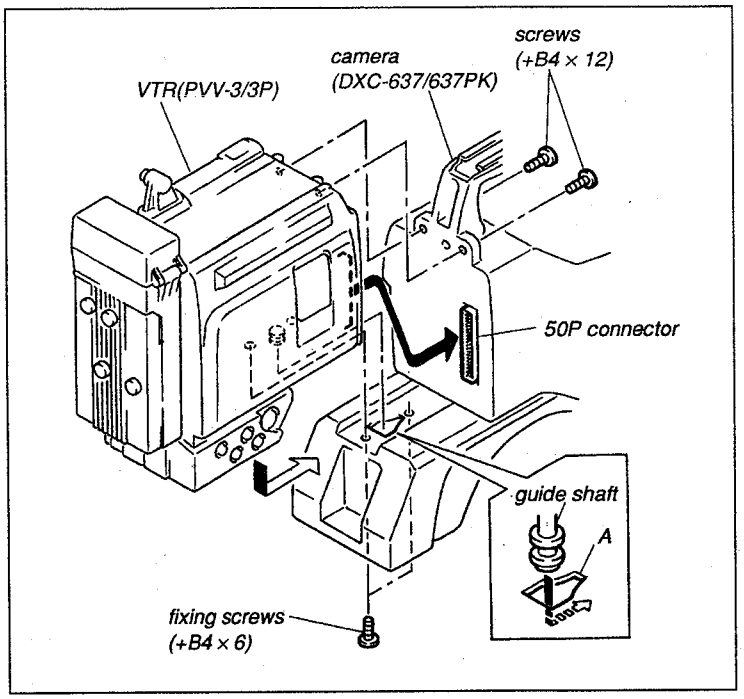
(a) Set the torque driver bit (for M2) on the torque driver.
(b) Set the torque driver on the screw at the top of the locking knob of the tape guide adjustment driver.
(c) Push down the torque driver and turn it clockwise.



2-5. CONNECTION OF VTR AND CAMERA

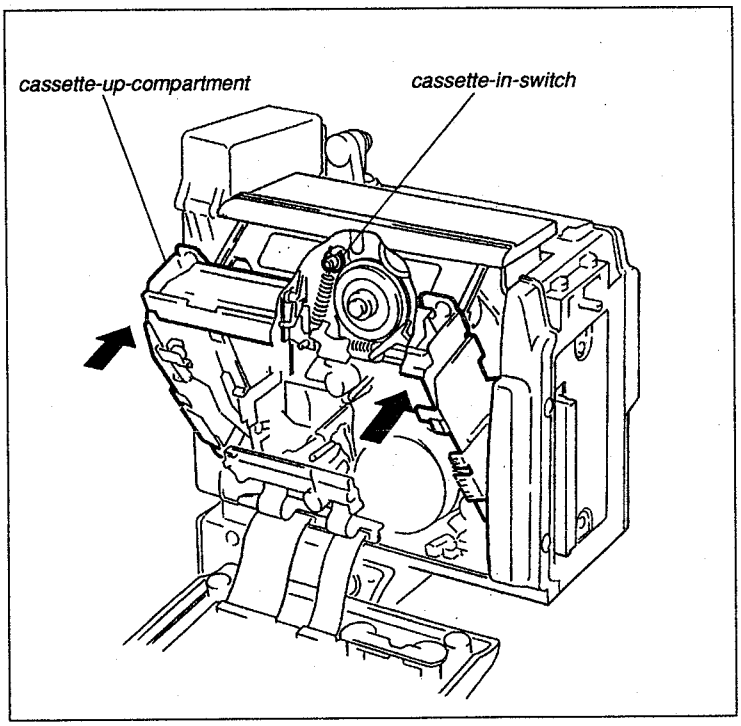
1. Align the projection of the VTR into the slot of the camera (DXC-637 and so on). Slide the VTR in the direction of the arrow , and press it so that the 50-pin connector is firmly fixed.
2. Install two B 4 × 12 screws (supplied) near the camera's grip, and B 4 × 6 screws (suppleid) on the camera's shoulder pad.
3. Remove the VTR from the camera in the reverse order of steps 1 and 2.

NOTE: When connecting the camera without supplying the screws (B 4 × 12 and B 4 × 6), use the screws with supplied to PVV-3/3P.



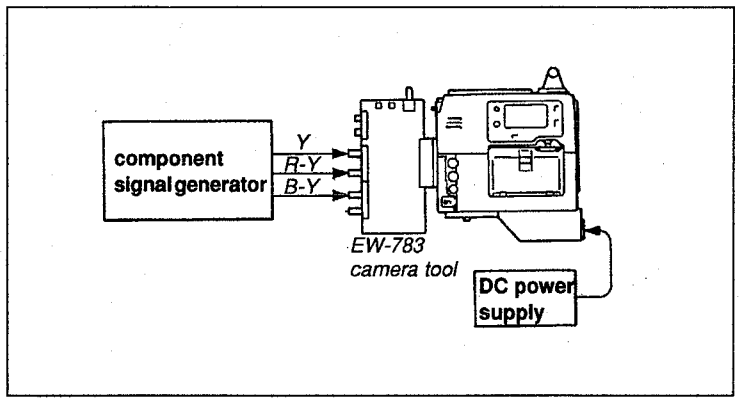
2-6. USING THE UNIT WITHOUT THE CASSETTE TAPE

1. Put the unit into EJECT mode.
2. Remove the cassette-up compartment lid. (refer to section 2-1.)
3. While pressing the Cassette-in switch, press both sides of the arm of the cassette-up compartment at the same time, and lock the arm.
   (NOTE) When pressing the arm of the cassette-up compartment, take great care not to damage it.
4. After moving the reel chassis and starting rotating the reel, release the Cassette-in switch.
5. Press the desired mode button.



2-7. PUT THE VTR INTO THE REC MODE WITHOUT CONNECTING A CAMERA

The PVV-3/3P cannot record the video and audio signals without connecting a camera. Therefore, in order to put VTR into the REC mode without connecting the camera, it is necessary to use the camera tool "EW-783". Use the camera tool (EW-783) to input the component signal from the component signal generator. The VTR is in REC mode.

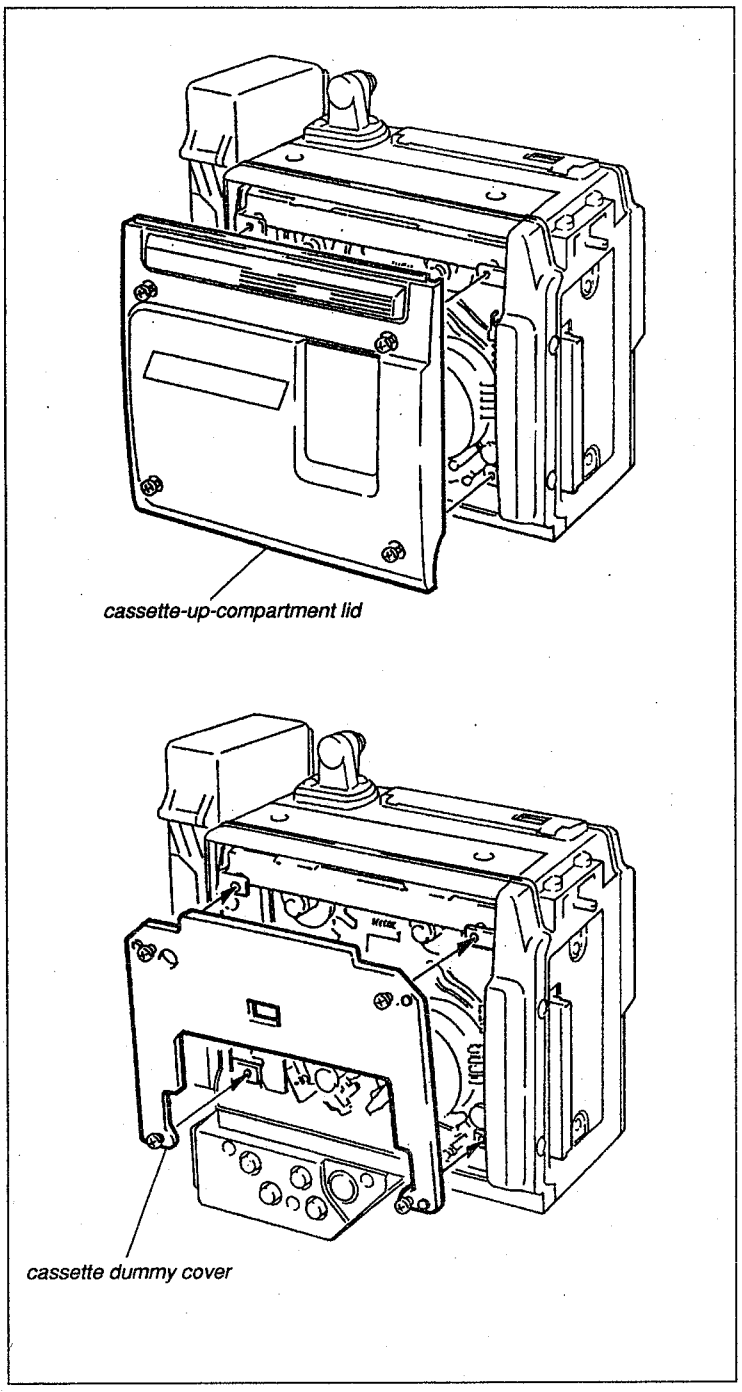


2-8. TAKING UP SLACK IN THE CASSETTE TAPE

1. Turn off the power switch.
2. Remove four screws, then remove the cassette-up compartment lid. (Refer to Section 2-1.)
3. Install the cassette dummy cover. (fixtures for service)

NOTE:

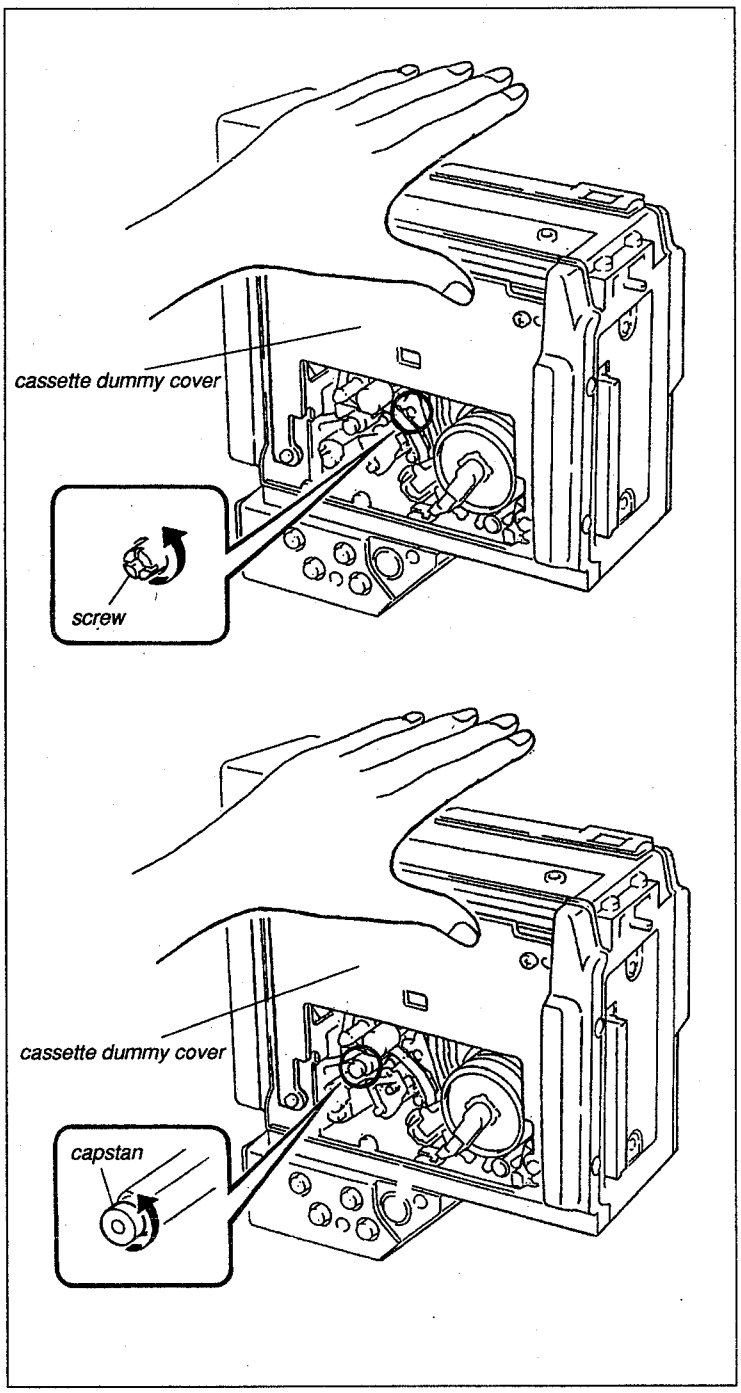
- Remove the lid gently it because it is connected to the AU-185 Board with flat cable and flexible card wire.
- After removing the cassette-up compartment lid, be sure to install the cassette dummy cover for reinforcement before operating because the cassette-up compartment lid is fragile.



4. While holding the cassette dummy cover downwards, turn the screw in the counterclockwise shown in the figure about four times with phillips screwdriver.

5. Turn the Capstan in the counterclockwise direction with fingers until the feed side of the cassette tape begins to rotate.

6. After winding the tape onto the cassette, release the cassette dummy cover, then take out the cassette tape.



2-9. CLEANING WHEN HEADS ARE CLOGGED

If the video head is clogged, clean the head as described in the following procedures.

- Cleaning with the cleaning cassette

1. Insert the cleaning cassette BCT-5CLN in the unit, then play back the tape for five seconds, and eject the tape at once.

   NOTE: • Make sure to use the cleaning cassette BCT-5CLN.
   If the cleaning is performed by cleaning cassettes other than the BCT-5CLN, abnormal friction or damage of the video head may occur.
   • Do not use the cleaning cassette with rewind.

2. Confirm that the head clog is clear.
   If the video head is clogged after cleaning with the cleaning cassette, clean the video head as described in the following procedure.

- Cleaning with the cleaning piece

1. Hold the cleaning piece moistened with cleaning fluid against the heads gently.

2. Slowly rotate the upper drum in the direction of the head's rotation with hand and clean the video head.

   NOTE: • Do not move the cleaning piece in a vertical direction. This will damage the video head.
   • Make sure to turn the POWER OFF, when cleaning is performed.

2-10. RELEASING THE HUMID TIMER WHEN THE UNIT IS HUMIDIFIED

When HUMID MODE is off in the SYSTEM MENU No.402, HUMID ALARM is displayed to protect the tape if the unit is humidified, and the VTR stops for a period specified by the HUMID TIMER.
The HUMID TIMER stops the operations of the unit to protect the tape if the unit becomes humidified, and this timer is designed to dehumidify the unit when left alone.
Therefore, if there is no humidity in the unit after the humidity is removed artificially, the unit cannot be started because the HUMID TIMER is not canceled.
To cancel the HUMID TIMER and start the VTR after removing the humidity artificially, perform the following steps:

1. Go to the SYSTEM MENU (refer to section 2-24) and enter HUMID TIMER OFF mode (MENU No.509).

   * xxx indicates the remained time (min)

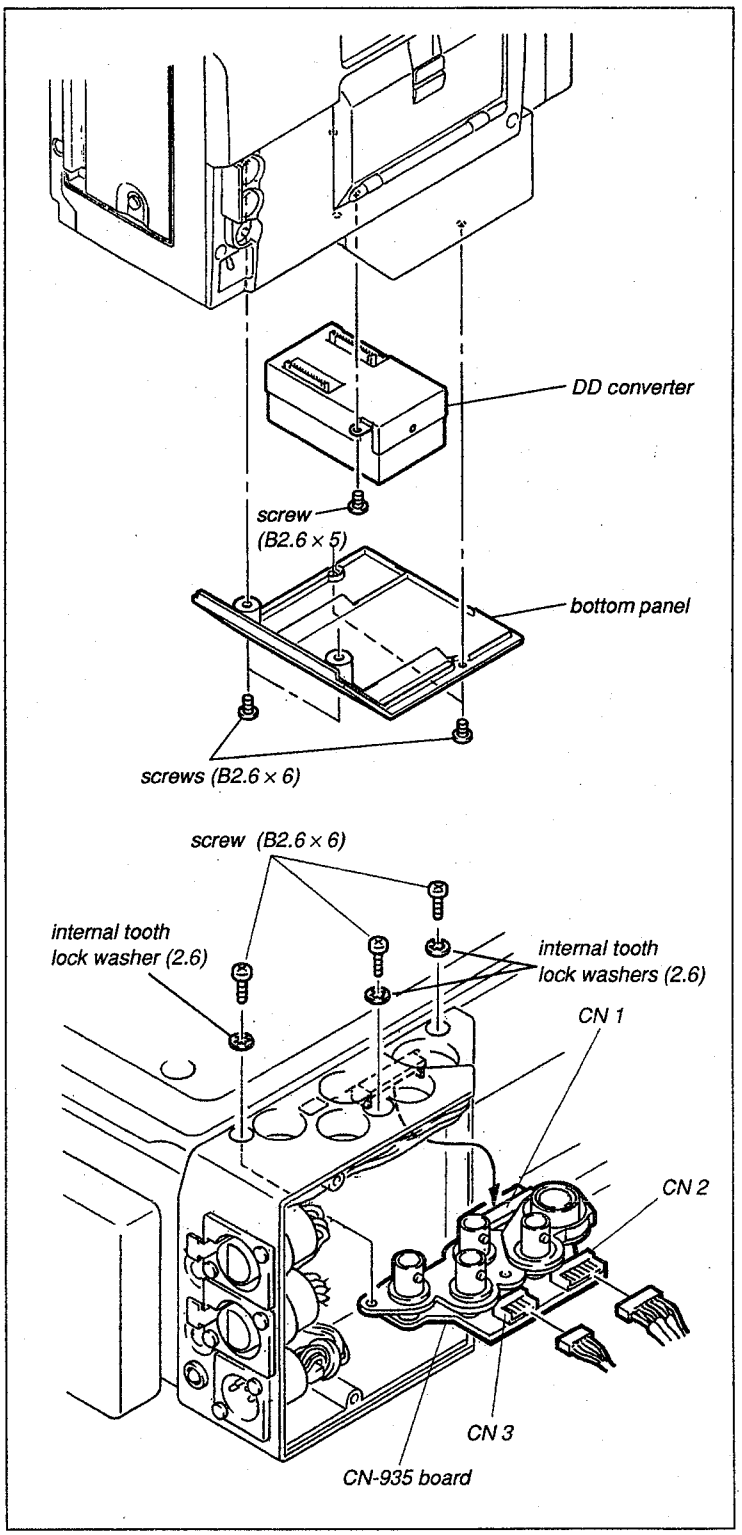
2. Press RESET twice to set XXX to 0 in order to cancel the HUMID TIMER.

* However, if the unit is still humidified, the timer cannot be canceled.

2-11. REMOVAL/INSTALLATION OF THE BOARDS

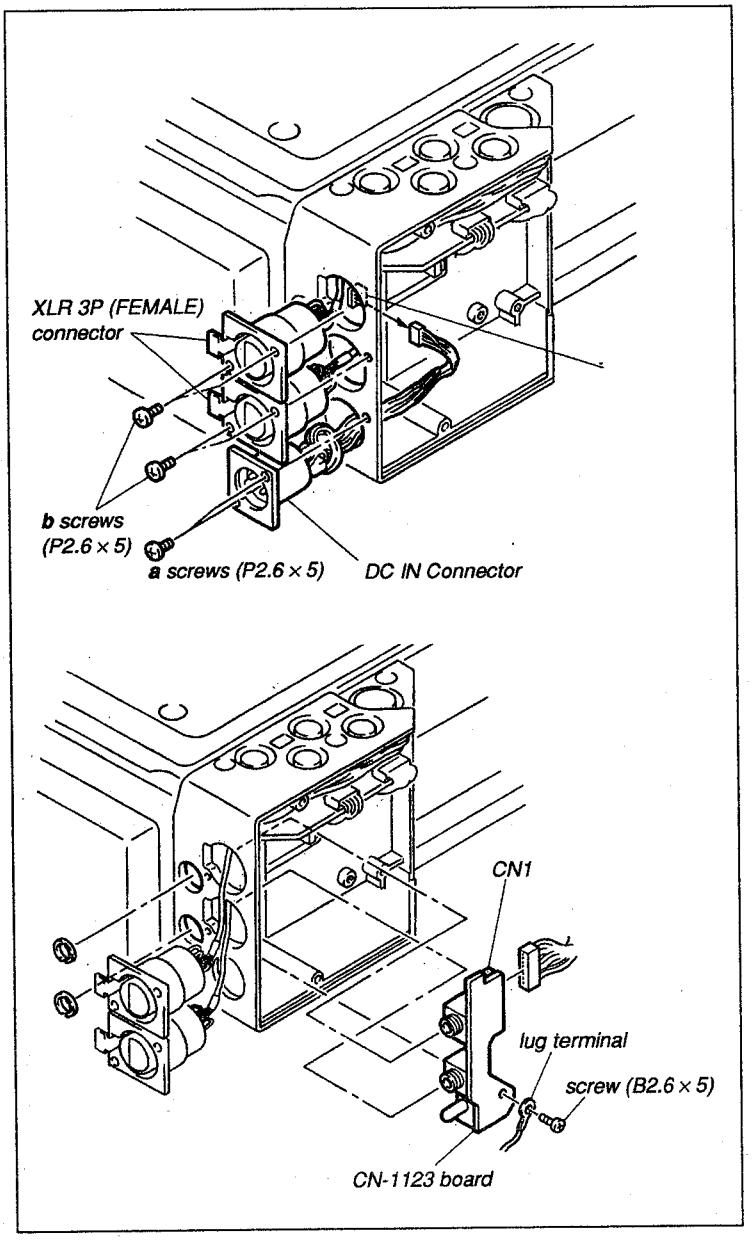
2-11-1. CN-935 Board

1. Remove four screws (B2.6 × 6), then remove the bottom panel.
2. Remove the screw (B2.6 × 5) shown in the figure, then remove the DD Converter.
3. Remove the three screws (B2.6 × 6) and three internal tooth lock washers (2.6) shown in the figure, then disconnect the connector (CN1) of the CN-935 board, then pull out the board.
4. Disconnect the two connector (CN2, CN3) of CN-935 board, then remove the board.



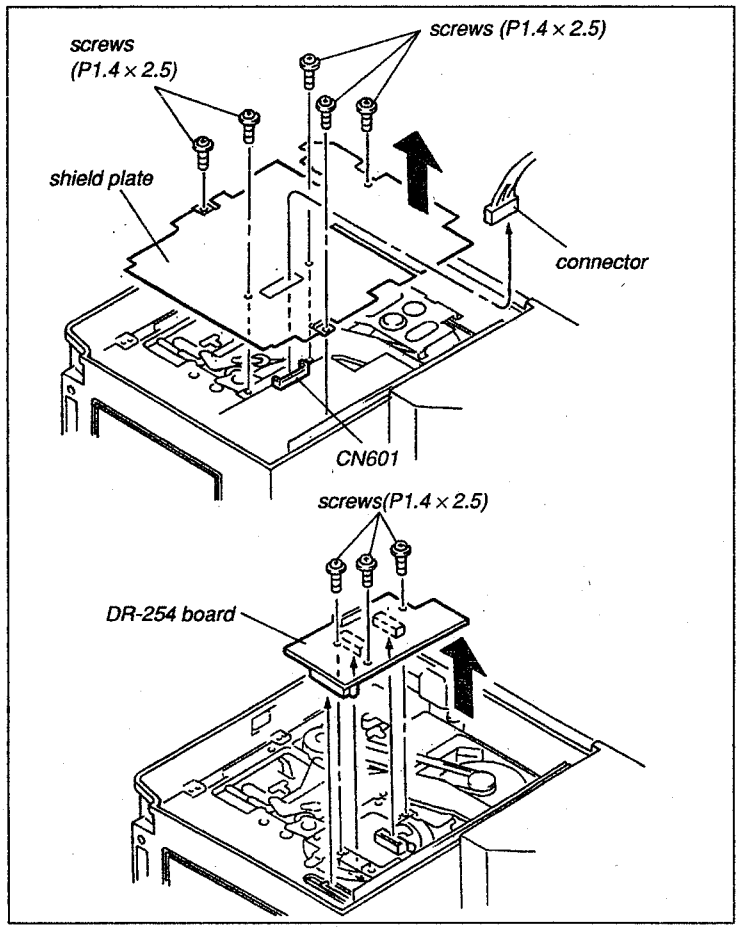
2-11-2. CN-1123 Board

1. Remove four screws, then remove the bottom panel. (Refer to Section 2-11-1.)
2. Remove a screw (B 2.6×5), then remove the DD Converter. (Refer to Section 2-11-1.)
3. Remove two screws a (P2.6 × 5) shown in the figure and disconnect the connector (CN24) of the MB-552 board, then remove the DC IN connector.
4. Remove four screws b (P2.6 × 5) shown in the figure, then remove two XLR connector (3P, FEMALE).
5. Remove the screw (B2.6×5) and the lug terminal of the CN-1123 board.
6. Remove the earphone jack and the remote jack with the jack not driver.
   (SONY Parts Number: 7-700-742-02)
7. Disconnect the connector (CN1) of the CN-1123 board , then remove the board.



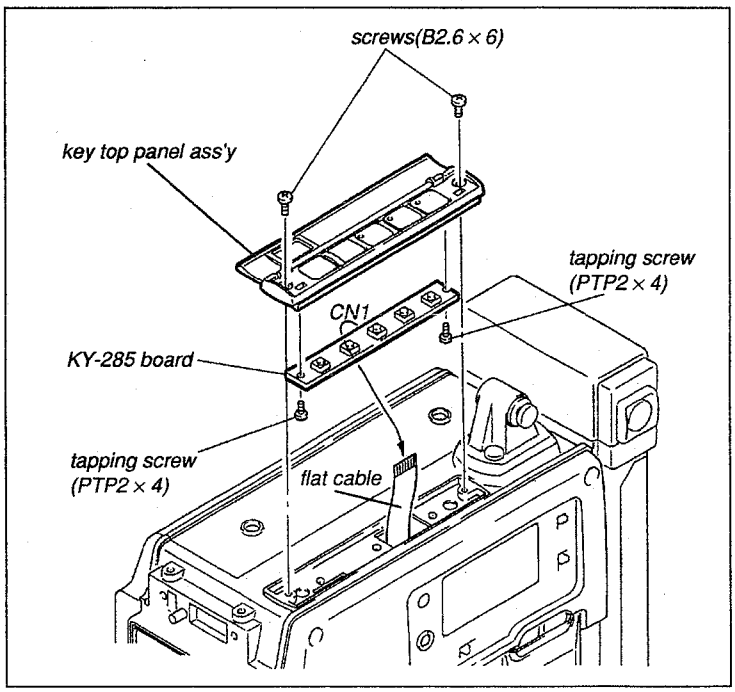
2-11-3. DR-254 Board

1. Open the right side panel. (Refer to Section 2-1.)
2. Remove the SS-57 board. (Refer to Section 2-11-7.)
3. Disconnect the connector (CN601) of the DR-254 board.
4. Remove five washerhead screws (P1.4 × 2.5), then remove the shield plate.
5. Remove three washerhead screws (P1.4 × 2.5), then remove the board.



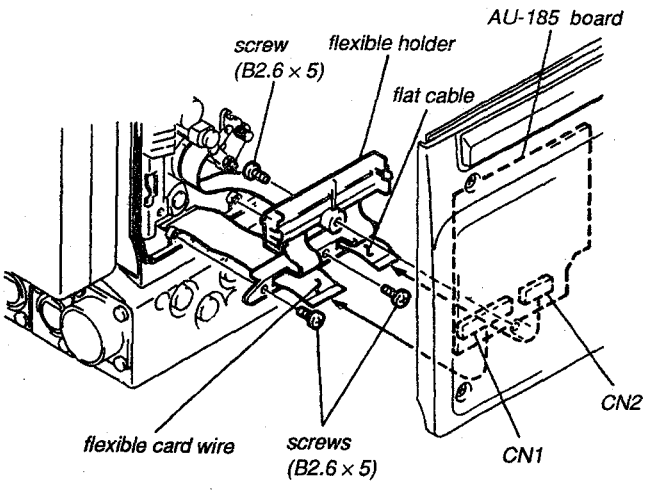
2-11-4. KY-285 Board

1. Remove two screws (B2.6 × 6) of Key top panel Ass'y.
2. Disconnect the flat cable (CN1) of the KY-285 board.
3. Remove two tapping screws (PTP2 × 4) of the KY-285 board, then remove the board.

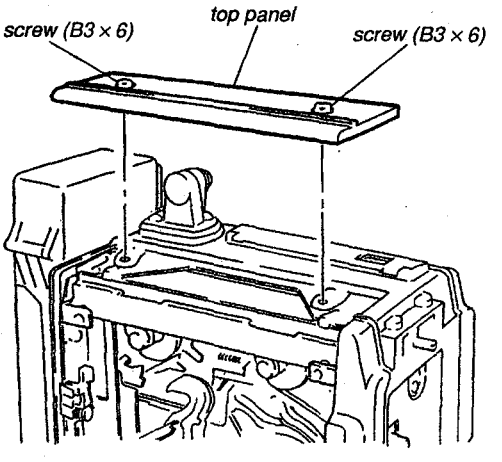


2-11-5. MB-552 Board

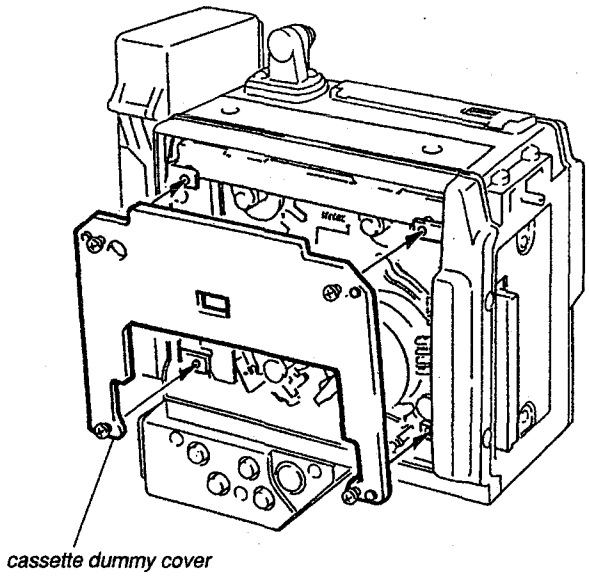
1. Open the right side panel. (Refer to Section 2-1.)
2. Remove the SS-57 board. (Refer to Section 2-11-7.)
3. Remove the left side panel and the cassete-up compartment lid. (Refer to Section 2-1)
4. Remove the three screws (B2.6 × 5) of the flexible holder, then disconnect the flexible card wire (CN1), and the flat cable (CN2) of the AU-185 board.



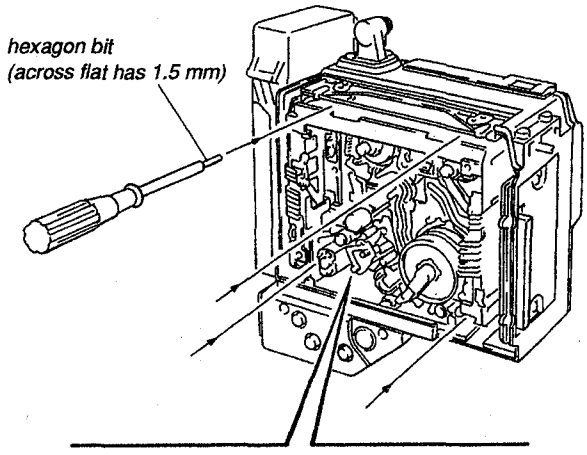
5. Loosen two screws (B3 × 6), then remove the TOP panel. (These screws are retained on the top panel, so they are not out of it).

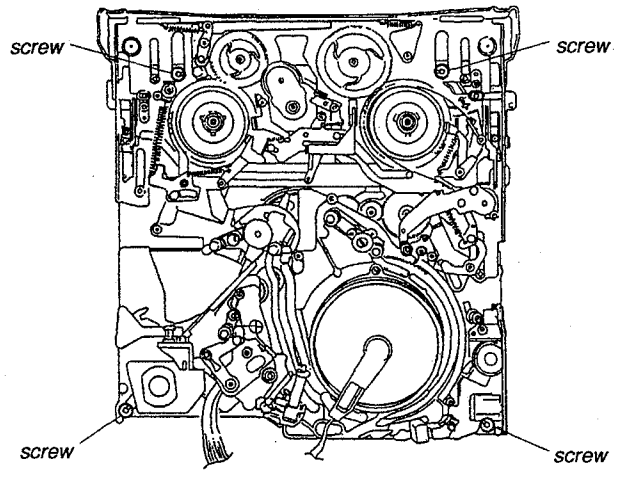


6. Install the cassette dummy cover (fixtures for service).

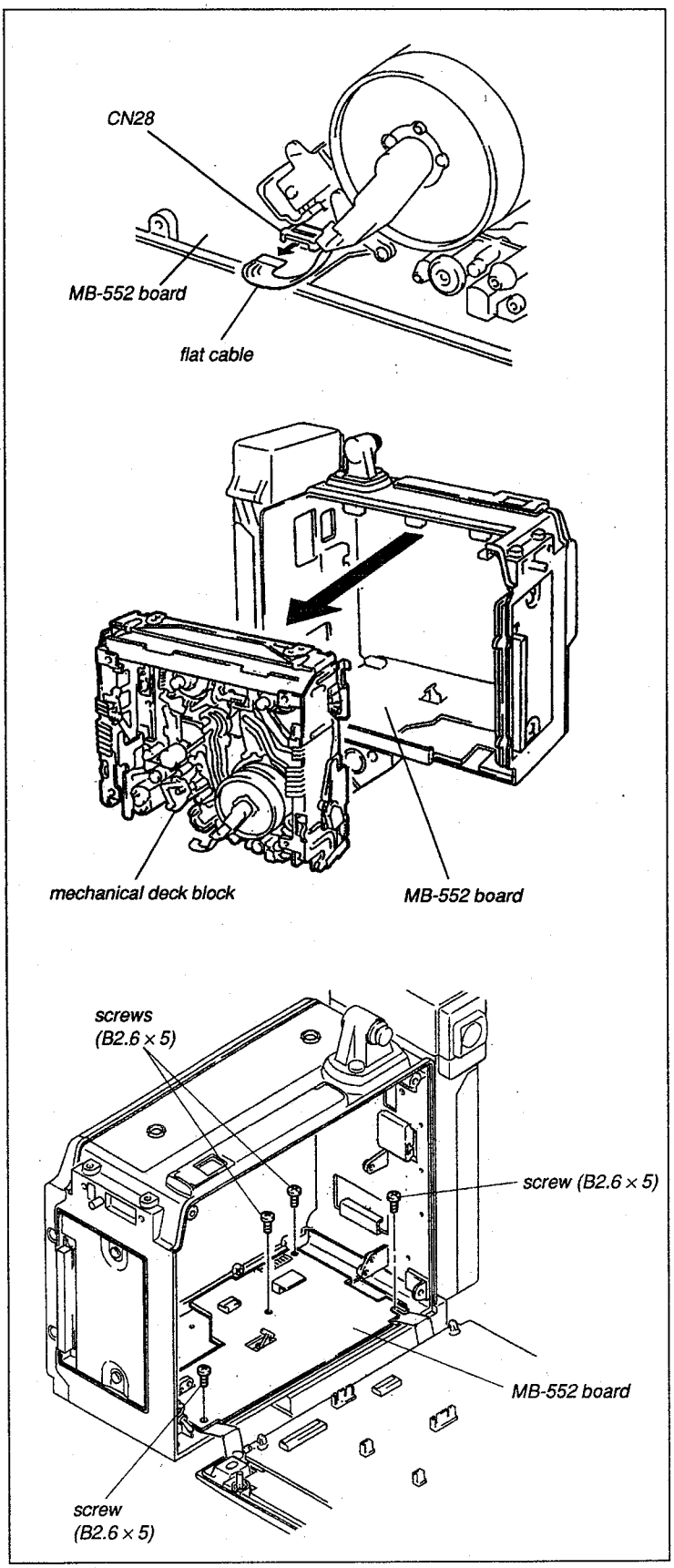


7. Loosen the four screws which secure the mechanical deck block to the unit by using hexagon bit (across flat has 1.5 mm).
(These screws are retained on the mechanical deck block, so they are not out of it.)





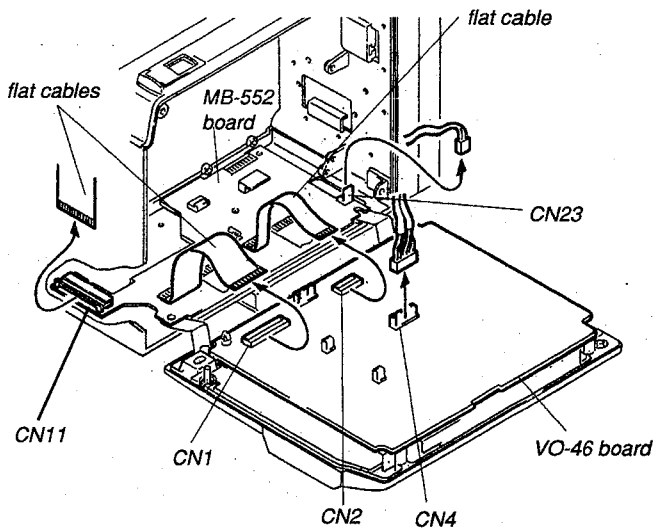
8. Disconnect the flat cable (CN28) of the MB-552 board, then remove the mechanical deck block.
9. Remove the SS-57 board.
   (Refer to Section 2-11-7.)



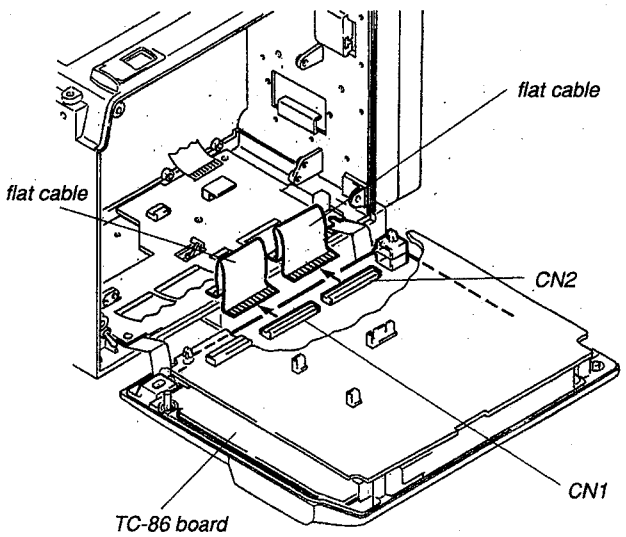
10. Remove four screws (B2.6 × 5) of the MB-552 board.

11. Disconnect the flat cable (CN11) and the connector (CN23) of the MB-552 board.

12. Disconnect the two flat cables (CN1, CN2) and the connector (CN4) of the VO-46 board.



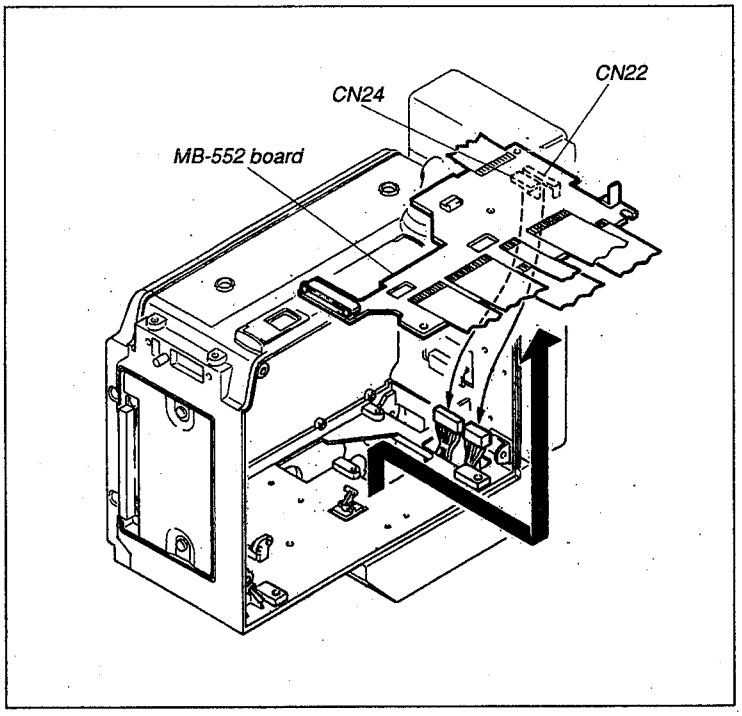
13. Disconnect the two flat cables (CN1, CN2) of the TC-86 board.



14. Remove the screw (B2.6 × 5), then remove the DD converter. (Refer to Section 2-11-1.)

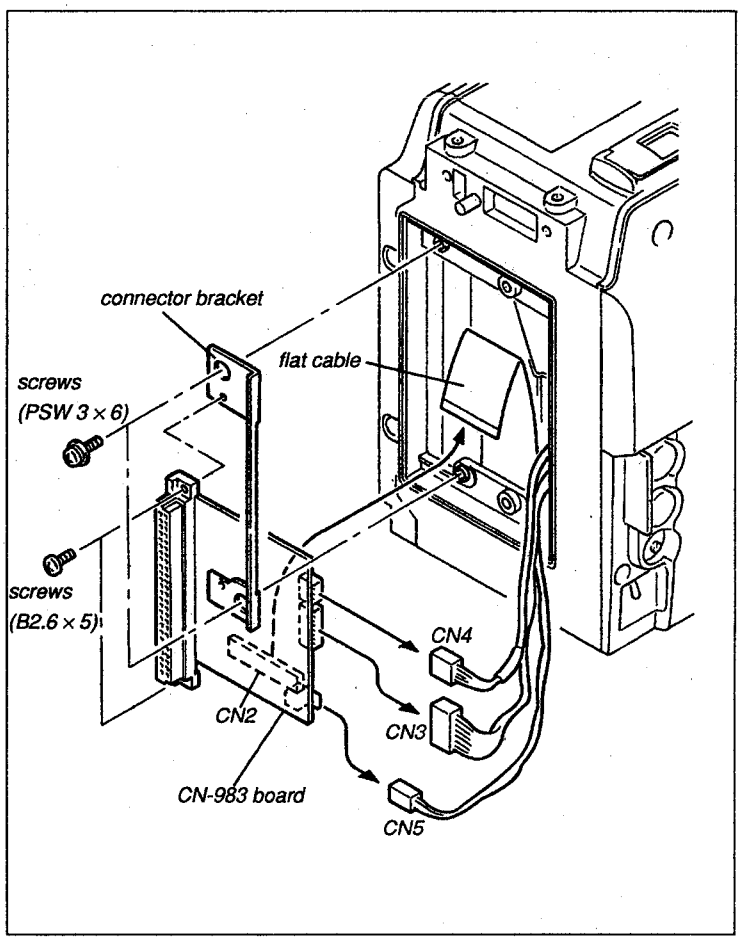
15. Remove the three screws (B2.6 × 6) and three internal tooth lock washers (2.6) and loosen the CN-935 board, then disconnect the connector (CN21) of the MB-552 board from the connector (CN1) of the CN-935 board. (Refer to Section 2-11-1.)

16. Disconnect the two connector (CN22, CN24) on the reverse side of the MB-552 board, then remove the board.



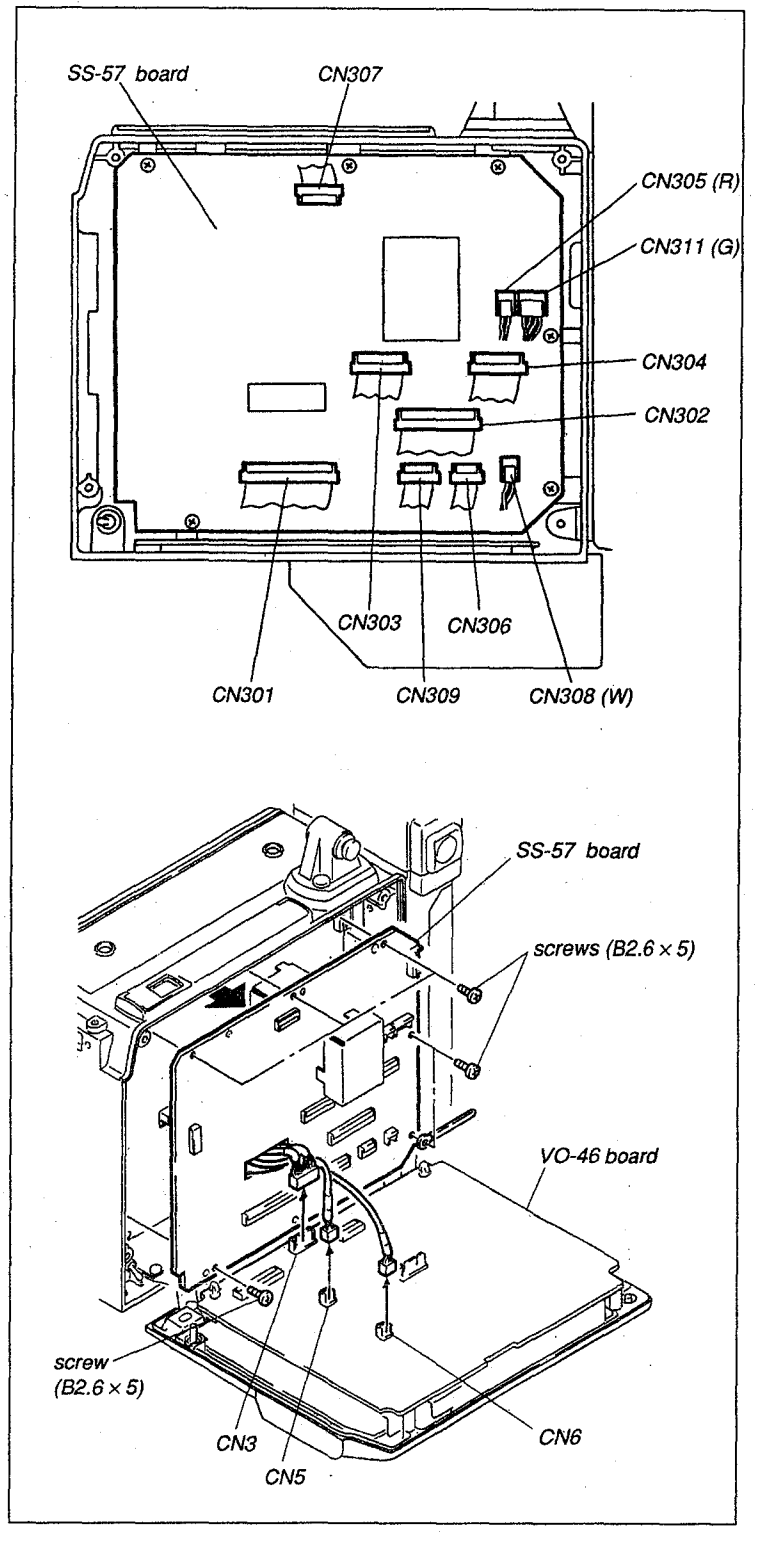
2-11-6. CN-983 Board

1. Remove the front panel. (Refer to Section 2-1.)
2. Remove two screws (PSW 3 × 6), then pull out the CN-983 board.
3. Disconnect the flat cable (CN2) and three connectors (CN3, CN4, CN5) of the CN-983 board.
4. Remove two screws (B2.6 × 5) of the connector bracket, then remove the CN-983 board.



2-11-7. SS-57 Board

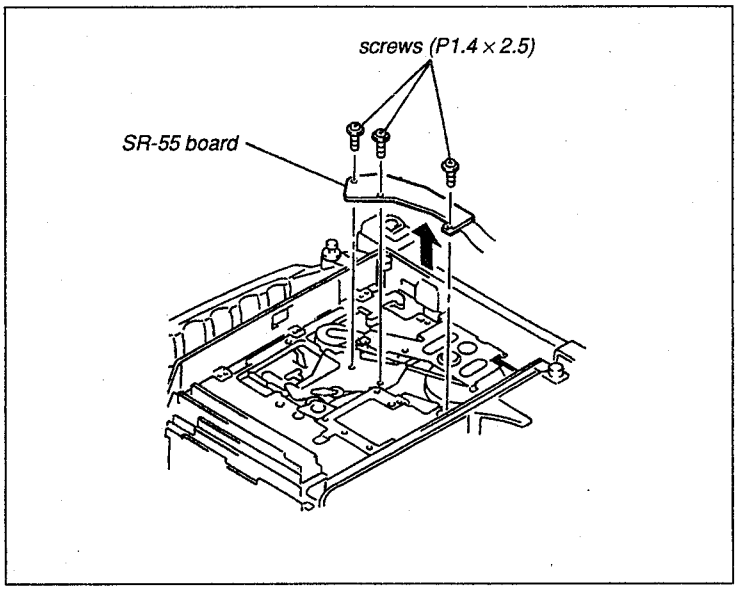
1. Open the right side panel. (Refer to Section 2-1.)
2. Disconnect the six flat cables (CN301, CN302, CN303, CN304, CN307, CN309) and the flexible card wire (CN306) of the SS-57 board.
3. Disconnect the three connector (CN305(R), CN308(W), CN311(G)) of the SS-57 board.



4. Disconnect the three connector (CN3, CN5, CN6) of the VO-46 board.
5. Remove six screws (B2.6 × 5) of the SS-57 board, then remove the board.

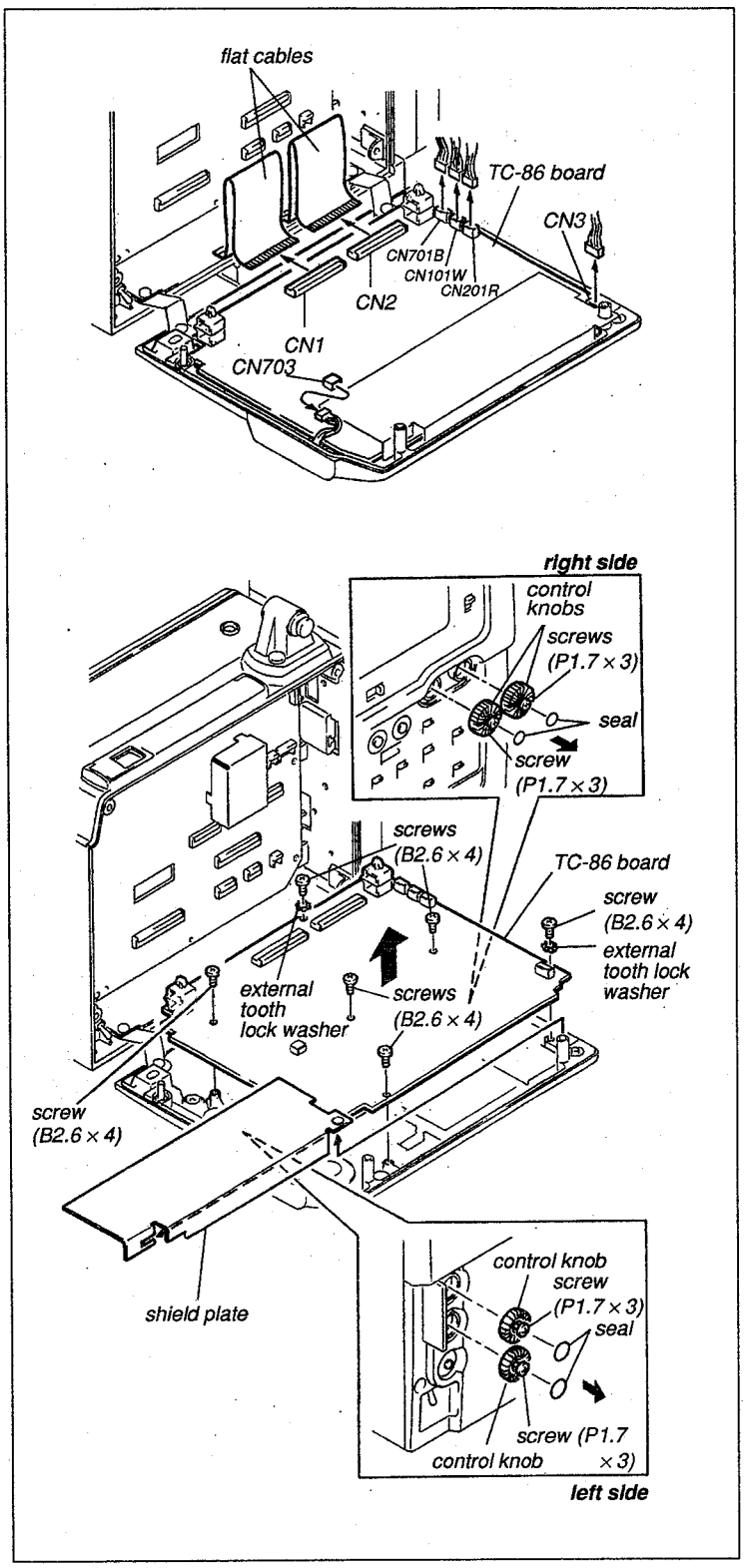
2-11-8. SR-55 Board

1. Open the right side panel. (Refer to Section 2-1.)
2. Remove the SS-57 board. (Refer to Section 2-11-7.)
3. Remove the DR-254 board. (Refer to Section 2-11-3.)
4. Remove three washerhead screws (P1.4 × 2.5), then remove the SR-55 board.



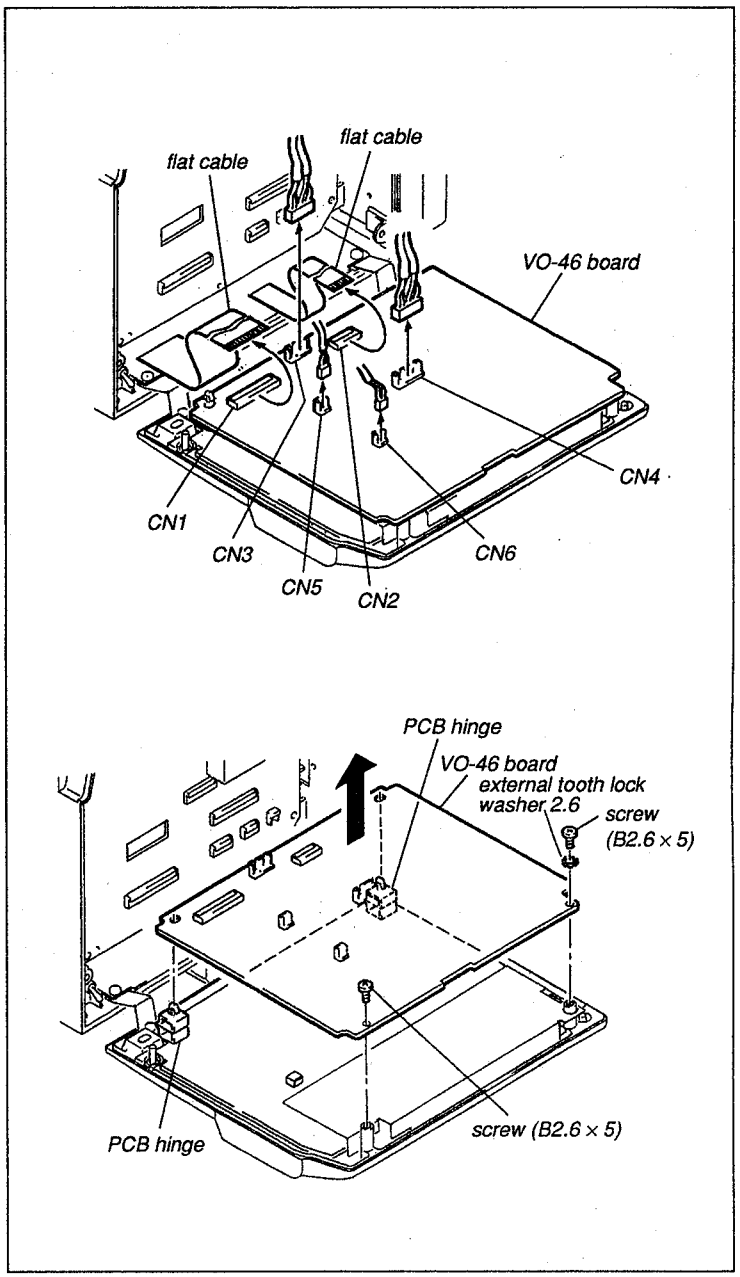
2-11-9. TC-86 Board

1. Open the right side panel. (Refer to Section 2-1.)
2. Remove the VO-46 board. (Refer to Section 2-11-11.)
3. Disconnect the two flat cables (CN1, CN2) and the five connector (CN3, CN201R, CN101W, CN701B, CN703) of the TC-86 board.
4. Remove the black seal of the volume knob, then loosen each screws (P1.7 × 3) of the Audio Level volume (CH-1 and CH-2).
5. Remove six screws (B2.6 × 4) and two external tooth lock washers of the TC-86 board, then remove the board.



2-11-10. VO-46 Board

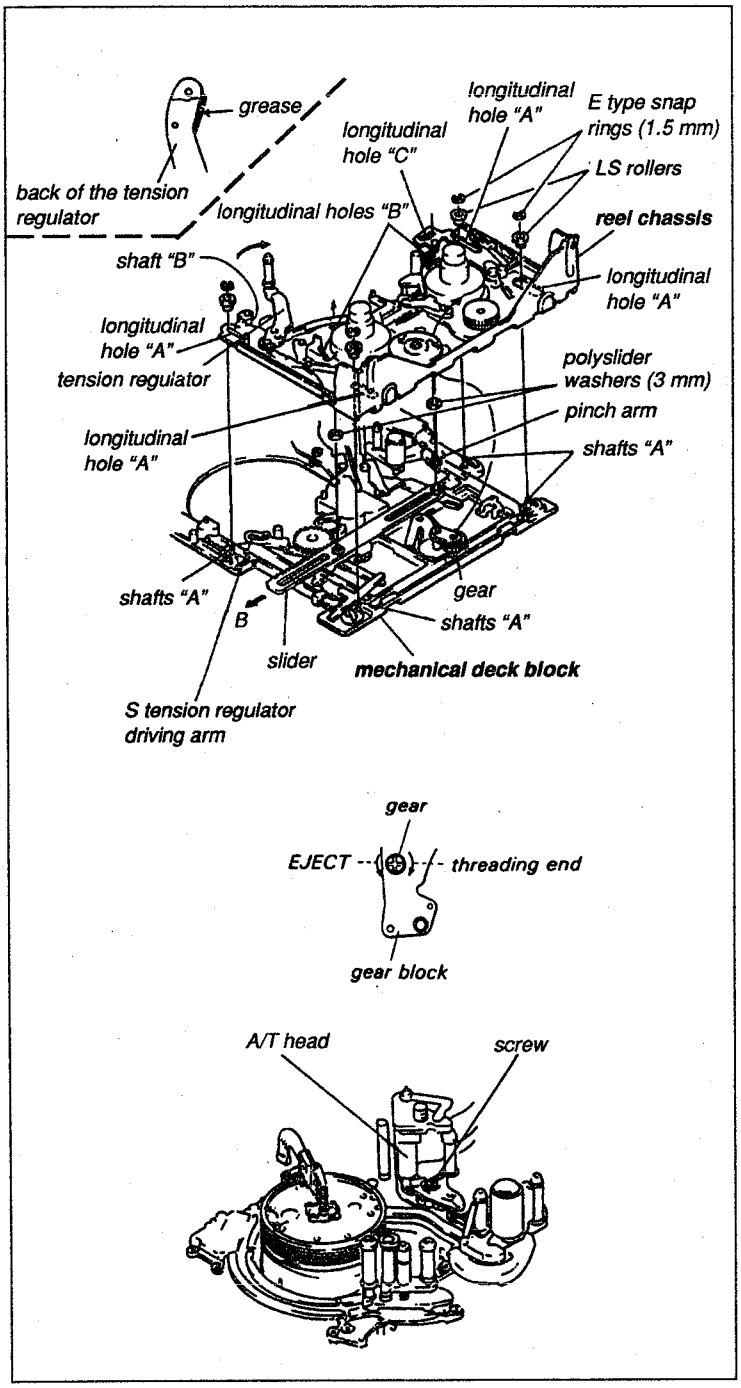
1. Open the right side panel. (Refer to Section 2-1.)
2. Disconnect the two flat cables (CN1, CN2) and the four connector (CN3, CN4, CN5, CN6) of the VO-46 board.
3. Remove two screws (B2.6 × 5) and the external tooth lock washer of the VO-46 board.
4. Remove the two PCB hinges shown in the figure, then remove the board.



2-12. INSTALLATION OF THE REEL CHASSIS

Tool : Sony grease
Sony oil
Mode: EJECT
Installation procedure:

1. Smear Sony grease on the back of the Tension Regulator of the Reel Chassis Assembly as shown in the figure.
2. Gently push the Tension Regulator Arm in the direction of the arrow A.
3. Apply a 1/4 drop of Sony oil on each of the four shafts "A" of the Mechanical Deck Block.
4. Move the slider in the direction of the arrow B fully by hand.
5. Insert 3 mm diameter polyslider washers (0.5 mm thick) (3-701-439-21) onto the two shaft of the slider.
6. Insert the Reel Chassis in the direction shown in the figure so that the gear is not contact with the reel chassis.
   (i) Insert the four shafts "A" of the Mechanical Deck Block into the four longitudinal holes "A" of Reel Chassis.
   (ii) Insert the two longitudinal holes "B" onto the two shafts of the Reel Chassis.
   (iii) Insert the longitudinal hole "C" of the Reel Chassis onto the Pinch Arm Roller.
   (iv) Insert the shaft "B" of the Reel Chassis into the longitudinal hole of the S Tension Regulator Driving Arm.
7. Insert the LS Roller (3-723-007) onto the four shafts "A" of the Mechanical Deck Block as shown in the figure. Fasten with the E type stop ring (1.5 mm).
8. Turn the screw on the front of the A/T Head by the screwdriver, and repeat threading and unthreading two or three times and check that they can be done smoothly.



2-13. REPLACEMENT OF FLAT CABLES/FLEXIBLE CARD WIRES

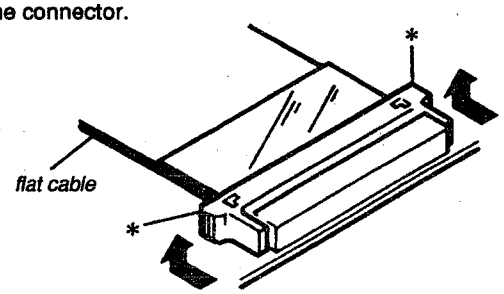
The following flat cables/flexible card wires are used on this unit.
Replace the flat cables or flexible card wires in the following procedures.
PVV-3/3P has the connectors of three angle types. Be careful to disconnect and connect the connectors.

Connection	Number of Pin	Number of Flat Cable/ Flexible Card Wire
AU-185 Board~ MB-552 Board	24P	1
DR-254 Board~ SS-57 Board	16P	1
KY-285 Board~ SS-57 Board	10P	1
MB-552 Board~ CN-983 Board	25P	1
MB-552 Board~ SS-57 Board	30P	1
MB-552 Board~ SS-57 Board	26P	1

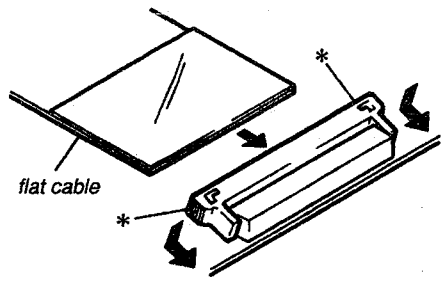
Connection	Number of Pin	Number of Flat Cable/ Flexible Card Wire
MB-552 Board~ TC-86 Board	30P	2
MB-552 Board~ VO-46 Board	24P	1
MB-552 Board~ VO-46 Board	10P	1
SS-57 Board~ capstan motor	15P	1
SS-57 Board~ Function cam sensor	8P	1
A/T HEAD ~ AU-185 Board/ SS-57 Board	10P/5P	1

<Angle Types>

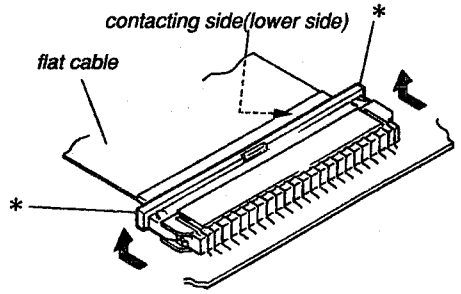
- Disconnecting procedure
  Slide the * marked portions of connector in the direction of the arrows, then disconnect the flat cable from the connector.



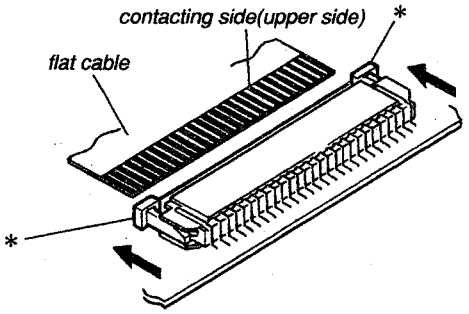
- Connecting procedure
  Pull up the * marked portions of the connector, insert the flat cable on its contacting side is faced to the flat cable, and insert it as far as it will go untill the line indicated on the flat cable. Push down the * marked portions, then slide it in the direction of the arrow to lock.



- Connecting/Disconnecting (MB-552 board, 25P)
  Slide the * marked portions of connector in the direction of the arrows, then disconnect the flat cable from the connector. For connecting, pull up the * marked portions, insert the flat cable. Push down the * marked portions, then lock the connector.



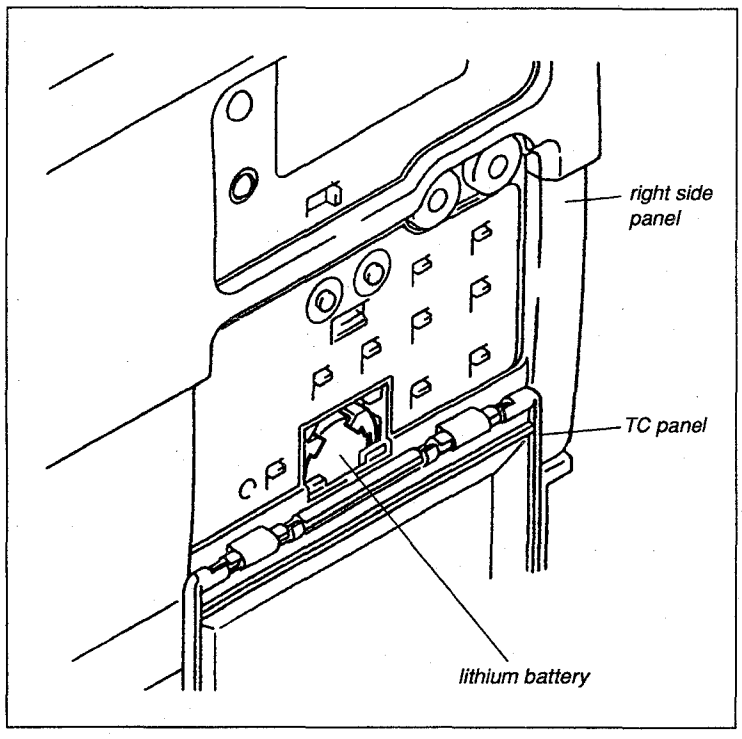
- Connecting/Disconnecting (CN-983 board, 25P)
  Slide the * marked portions of connector in the direction of the arrows, then disconnect the flat cable from the connector. For connecting, insert the flat cable and push down the * marked portions. Then, lock the connector.



2-14. NOTE ON REMOVING THE PRINTED CIRCUIT BOARDS

When the power switch is turned off, power of this unit is supplied in order to keep the time code data. As to TC-86 board, keep the time code data by the lithium battery.
Replace the board when power is supplied, there is possibility of the damage of IC in the board.
Before removing the board, shut off the power as descrived in the following procedures.

1. Turn the power switch off.
2. Remove the lithium battery from the TC panel. (This applys to the removal of the TC-86 board only.)
3. Remove the battery.
4. Disconnect the cable from the EXT DC IN connector.



2-15. CONNECTOR INPUT/OUTPUT SIGNAL

INPUT

GENLOCK VIDEO IN : BNC Type
1.0 Vp-p, 75 Ω

TC IN : BNC Type
0.5 to 18 Vp-p,10 kΩ

OUTPUT

VIDEO OUT : BNC Type
1.0 Vp-p, 75 Ω

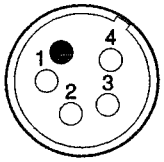
TC OUT : BNC Type
1.0 Vp-p, 75 Ω

EAR : – ∞ to –20 dBu variable, 8 Ω
(STEREO MINI JACK)

REMOTE CONTROL TERMINAL

REMOTE : REC TRIGGER INPUT,
TALLY LAMP OUT PUT
(MINI JACK)

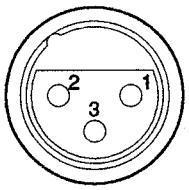
DC IN (4P, MALE)



(EXT VIEW)

Pin No.	Signal	Specification
1	EXT DC IN (G)	GND
2	———	———
3	———	———
4	EXT DC IN (X)	10.5 to 17.0 Vdc

CH–1/2 (+48 V) (3P FEMALE)

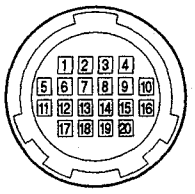


(EXT VIEW)

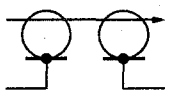
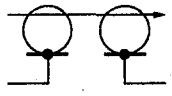
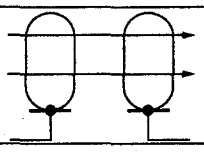
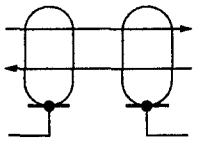
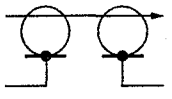
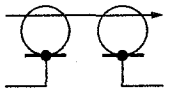
CH–1/2 (+48 V)

Pin No.	Signal	Specification
1	CH–1/2 IN (G)	GND
2	CH–1/2 IN (X)	–60 dBu/Zi ≧ 3 kΩ +4 dBu/Zi ≧ 10kΩ BALANCED
3	CH–1/2 IN (Y)	

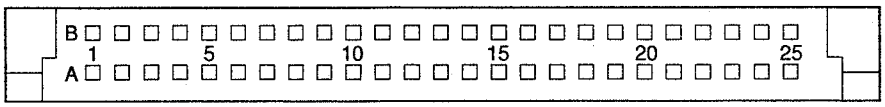
PB ADAPTOR CONNECTOR (20P, FEMALE)

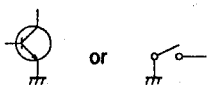
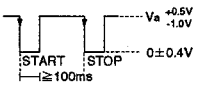


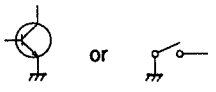
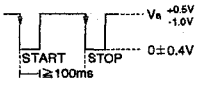
(EXT VIEW)

Pin No.	Signal	VTR	Direction	PB Adator
1	Y-RF (X)	75 Ω 0.2 Vp-p (Center Carrier)		Z = 75 Ω
2	Y-RF (G)			
20	C-RF (X)	75 Ω 0.2 Vp-p (Center Carrier)		Z = 75 Ω
19	C-RF (G)			
3	AUDIO CH1 (X)	LOW Impedance –10 dBu		Z = 10 kΩ
5	AUDIO CH2 (X)			
4	AUDIO (G)			
16	Y SW PULSE (X)	1,3 CH : H 2,4 CH : L OPEN COLLECTOR		Z = 10 kΩ, Pull up +5 V
18	ADVANCE SYNC (X)	Z = 75 Ω		2 ± 0.5 Vp-p, 75 Ω
15	ADVANCE SYNC (G)			
6	CONTROL SIG. 1	METAL "H" FF/REW "M" H = 5.0 V M = 2.5 V		High impedance
17	CONTROL SIG. 2	PLAY : HIGH (> 6.5 V) Z = 10 kΩ		Z = 57 kΩ
9	VIDEO (X)	75 Ω 1 Vp-p		Z = 75 Ω
10	VIDEO (G)			
7	GND			
8	GND			
13	+12 V			
14	+12 V			
12	C SW PULSE (X)	1,3 CH : L 2,4 CH : H (0.3 V) EMITTER FOLLOWER (OPEN)		Z = 75 Ω
11	C SW PULSE (G)			

50 PIN CONNECTOR (50P, FEMALE)



Pin No.	Input/output signal	Specifications			Note
		Camera	Direction	VTR	
A1	MODE ID	MODE ID 100 kΩ ± 10% 5.0 V dc ± 10%, PULL UP	←	MODE ID OPEN: Y/R-Y/B-Y mode GND: R/G/B mode	
B1	CHASSIS GND		↔		
A2	MIC1 (Y)	–60 dBu	→	Zi ≧ 3 kΩ	
B2	MIC1 (X)				
A3	MIC1 (G)				
B3	EAR PHONE (GND)	Zi = 750 Ω ± 10%	←	Zo ≦ 100 Ω, –6 dBu	0 dBu = 0.775 V rms
B4	EAR PHONE (X)				
A4	REC/TALLY INDICATION	Zi ≧ 600 Ω	←	ON: 4.0 ~ 5.5 V dc OFF: 0 ± 0.2 V dc	
B5	REC STATUS (REC RESET)	Zi ≦ 10 kΩ 5.0 V dc ± 10%, PULL UP REC: H	←	Open collector	
A5	VTR TRIGGER (L: VTR START/STOP)	ON ↔ OFF OPEN ↔ CLOSE START/STOP START/STOP Vceo ≧ 12V chattering ≦ 50 ms 	→	Zi ≧ 10 kΩ Pull Up Va ≦ 10 V	
A6	S.D. (V/C)	Zi ≧ 47 kΩ, PULL UP	←	Zo ≦ 1 kΩ, H; 5.0 $^{+0.5}_{-1.0}$ V L; 0 ± 0.5 V	
B6	S.D. (C/V)	Zo ≦ 1 kΩ, H; 5.0 $^{+0.5}_{-1.0}$ V L; 0 ± 0.5 V	→	Zi ≧ 47 kΩ, PULL UP	
A7	S.CLOCK	Zi ≧ 47 kΩ, PULL UP	←	Zo ≦ 1 kΩ, H; 5.0 $^{+0.5}_{-1.0}$ V L; 0 ± 0.5 V	
B7	S.CS	Zi ≧ 47 kΩ, PULL UP	←	Zo ≦ 1 kΩ, H; 5.0 $^{+0.5}_{-1.0}$ V L; 0 ± 0.5 V	
A8	GEN LOCK VIDEO (G)	Zi ≧ 1 kΩ ± 5%	←	Zo ≧ 75 Ω ± 10% W/camera V dc = 0 ± 0.2 V dc VBS: 1.0 V p-p sync; negative	
B8	GEN LOCK VIDEO (X)				
A9	SYNC, CF (G)		↔		
B9	COMP.SYNC (X)	H: 4.0 ~ 5.5 V p-p; negative, L: 0 ± 0.4 V dc Zo ≦ 2 kΩ	→	Zi ≧ 10 kΩ	
A10	PLAYBACK VIDEO (G)	Zi ≧ 1 kΩ ± 5%	←	1.0 V p-p sync: negative Zo ≦ 75 Ω ± 5% V dc = 0 ± 0.2 V dc	
B10	PLAYBACK VIDEO (X)				
A11	COLOR FRAMING PULSE (X)	H: 4.0 ~ 5.5 V p-p; negative, L: 0 ± 0.4 V dc Zo ≦ 2 kΩ	→	Zi ≧ 10 kΩ	

Pin No.	Input/output signal	Specifications			Note
		Camera	Direction	VTR	
B11	PLAYBACK STATUS (VF H: CAM/L: PB)	Zi ≧ 1 kΩ 4.5 ~ 9.5 V dc, PULL UP	←	CAM mode: OPEN PB mode: 0 ± 0.4 V dc	
A12	VBS (G)	1.0 V p-p ± 10% Zo = 75 Ω ± 5% V dc = 0 ± 0.2 V	→	Zi = 75 Ω ± 5%	
B12	VBS (X)				
A13	VTR SAVE	STANDBY: 4.0 ~ 5.5 V dc SAVE: 0 ± 0.25 V dc Zo ≦ 100 Ω	→	Zi ≧ 1 kΩ	
B13	VTR/CCU CONT	VTR: 0 ± 0.25 V dc, CCU: 5.0 ± 0.5 V dc, Zo ≦ 1 kΩ	→	Zi ≧ 4.7 kΩ	VTR: Open
A14	NC				
B14	NC				
A15	NC				
B15	NC				
A16	Y/R-Y/B-Y (G)		→		
B16	R-Y (X)	0.756 V p-p, setup 0%	→	Zi = 1 kΩ ± 2%	
		Zo = 50 ~ 75 Ω			
A17	Y (X)	0.714 V p-p, sync 0.286 V p-p, setup 0% Zo = 50 ~ 75 Ω	→		
B17	B-Y (X)	0.756 V p-p, setup 0% Zo = 50 ~ 75 Ω	→		
A18	BATT ALARM (BATT IND)	Zo = 470 ~ 10 kΩ	←	ON: 2.0 ~ 3.0 V dc (470 Ω) OFF: 0 ± 0.4 V dc	
B18	REC REVIEW (L: RETURN CONTROL)	ON ↔ OFF OPEN ↔ CLOSE START/STOP START/STOP Vceo ≧ 12V chattering ≦ 50 ms 	→	Zi ≧ 10 kΩ Pull Up Va ≦ 10 V	
A19	SERIAL DATA (X) (CAMERA SO)		↔		Non Connection
B19	SERIAL DATA (G)				
A20	NC				
B20	NC				
A21	NC				
B21	GND				
A22	POWER +12 V DC		←	Min.: 10.6 V dc at 2 A Max.: 17.0 V dc	
B22	POWER +12 V DC				
A23	POWER GND		←		
B23	POWER GND				
A24	SPARE				
B24	SPARE				
A25	CHASSIS GND		↔		
B25	CHASSIS GND				

2-16. APPLICABLE CONNECTOR

When external cables are connected to the various connectors on the connector panel during maintenance, the hardware listed below (or equivalents) must be used.

Panel Indication	Applicable connector
CH-1/CH-2 (+ 48 V)	1-508-084-00 CONNECTOR, XLR 3P, MALE
DC IN	1-508-362-00 CONNECTOR, XLR 4P, FEMALE
TC IN/OUT	1-560-069-11 CONNECTOR, BNC, MALE
GENLOCK VIDEO IN	1-560-069-11 CONNECTOR, BNC, MALE
VIDEO OUT	1-560-069-11 CONNECTOR, BNC, MALE
PB ADAPTOR	1-566-771-11 CONNECTOR, 20P, MALE
EAR	PLUG, MINI, STEREO
REMOTE	PLUG, MINI
50P Connector (Not indicated on the panel)	1-566-579-11 CONNECTOR 50P, MALE

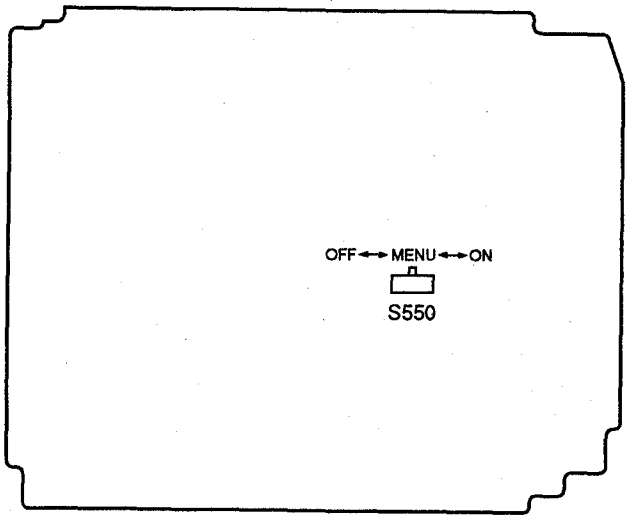
2-17. BOARD SWITCH SETTINGS

2-17-1. TC-86 Board

- S550 (DOLBY, OFF ⇔ MENU ⇔ ON)

When this switch is set to MENU, the unit is entered to the SYSTEM MENU (menu No. 303), then selecting of this switch can be performed.
(refer to section 2-24 for the operation of MENU.)

The factory setting is MENU.



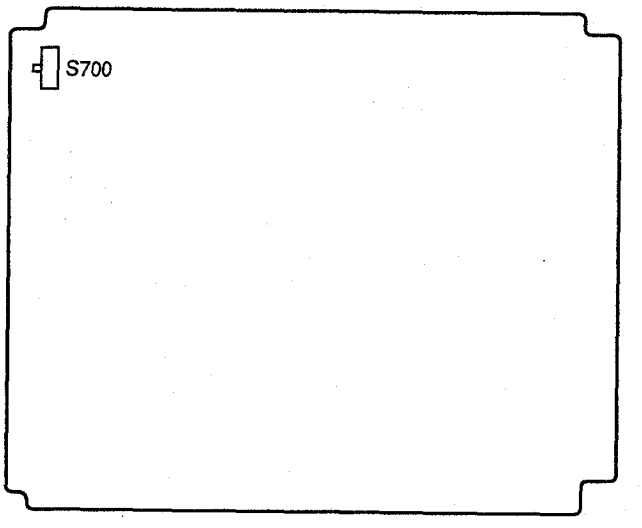
TC-86 BOARD (COMPONENT SIDE)

2-17-2. VO-46 Board

- S700

Sets H-LOCK to ON or OFF in PB mode.

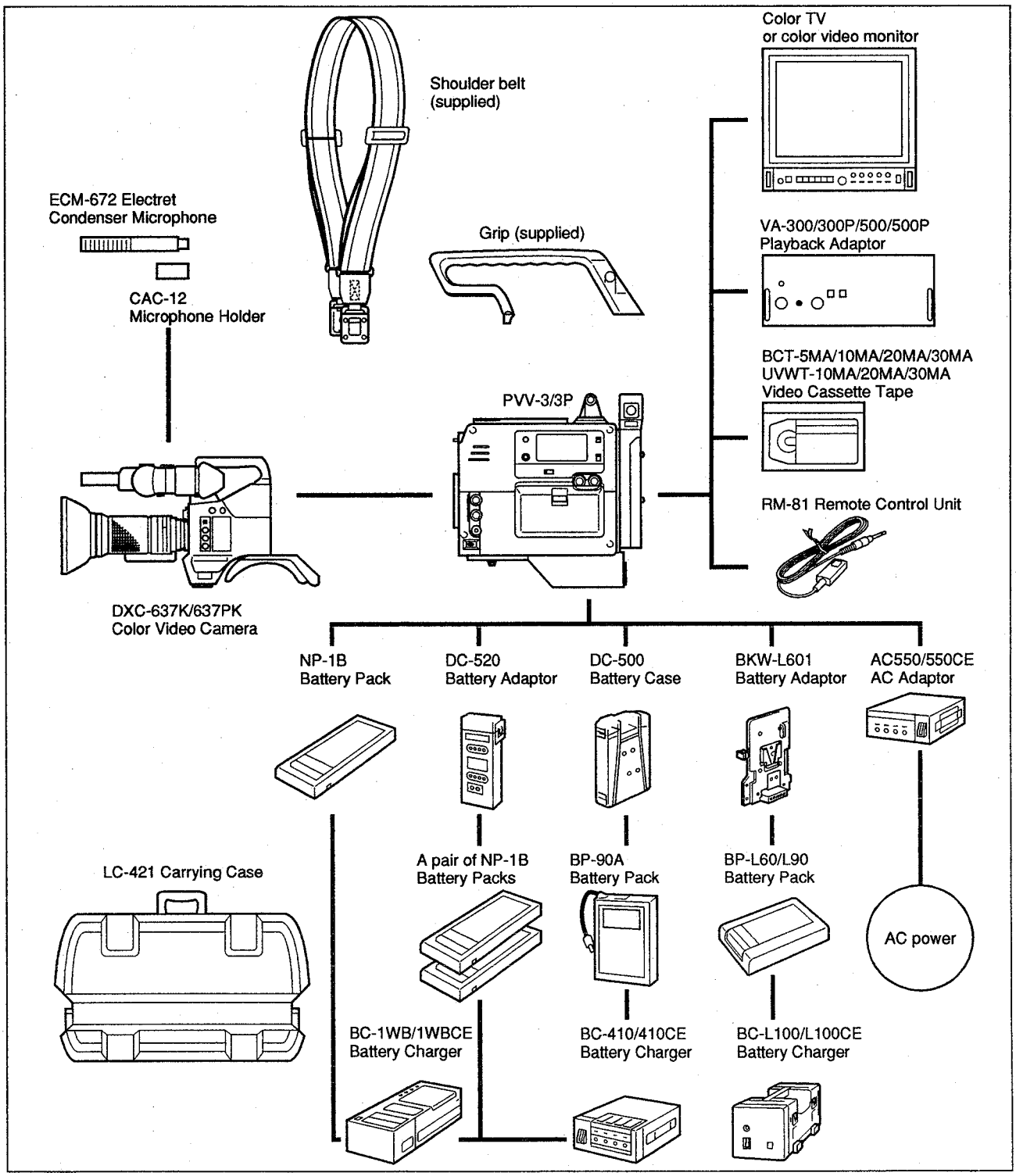
The factory setting is ON.



VO-46 BOARD (COMPONENT SIDE)

2-18. EXAMPLE SYSTEM CONFIGURATION

This unit can be attached to a DXC-637/637P/537A/537AP/327A/327AP series color video camera to make up a combination camera/VTR.
The diagram below shows an example camera/VTR system configuration in which the camera is a DXC-637K or DXC-637PK depending on whether the VTR is an PVV-3 or PVV-3P



2-19. CHANGING THE VOLTAGE OF BATTERY BEFORE END/END

2-19-1. Changing the Voltage of Battery Before End/ End (1)

The voltage of the battery before end can be changed with an external DC battery from the SYSTEM MENU as follows:

Range setting: 11.0 V to 12.5 V
Minimum setting unit: 0.1 V
Voltage of Battery before end: set to 11.3 V when shipped. (Battery almost exhausted)
Voltage of Battery end: set to 11.0 V when shipped. (Battery exhausted)
Equipment Reguired:Camera (DXC-637 and so on),
DC battery, Digital voltmeter,
Blank tape (BCT-30Ma)
Switches settings: LIGHT, BACK TALLY, LIGHT; OFF

[Set up]

1. Remove the bottom panel.
   (Refer to section 2-11-1, step 1.)
2. Connect a camera (DXC-637 and so on) to the PVV-3/3P.
3. Connect a DC battery to the DC IN connector.
4. Insert a blank tape and put the unit into REC mode.

NOTE: • Contact the lead tip of the digital voltmeter to the DC connector as shown in Fig.1, and adjust the voltage of the DC battery to be the desired value.
• Be careful not to contact the lead tip of the digital voltmeter to the DC-DC converter. To prevent the battery from shorting, we recommend to tape the side of the DC-DC converter.

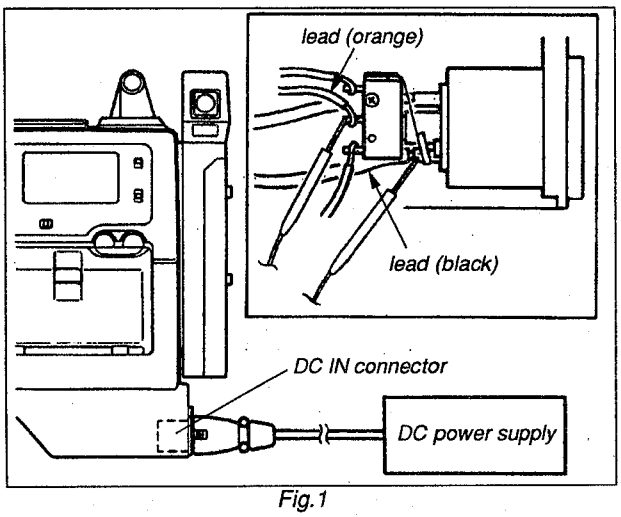


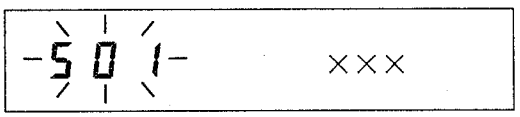
Fig.1

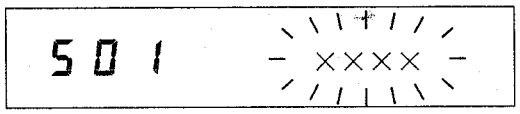
[Battery before end setting mode]

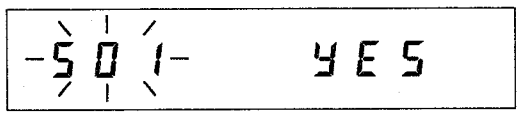
1. Go to the SYSTEM MENU (refer to section 2-24), and select "Battery before end setting" mode (Menu No. 501).
2. Press the RESET (MENU SET) button to turn the voltage display part off then on, then input the desired voltage. with measured by digital voltmeter to the DC IN connector.
3. Press the RESET (MENU SET) button (the desired voltage is stored in EEPROM).
   When the desired voltage is stored, display "YES".
   If the value cannot be stored in EEPROM because of an error, display "no". In this case,repeat steps 1 to 3.

NOTE: The value shown in the voltage display part of LCD is only for reference.

LCD Display
* XXX indicates the remaind time.







[Battery end setting mode]

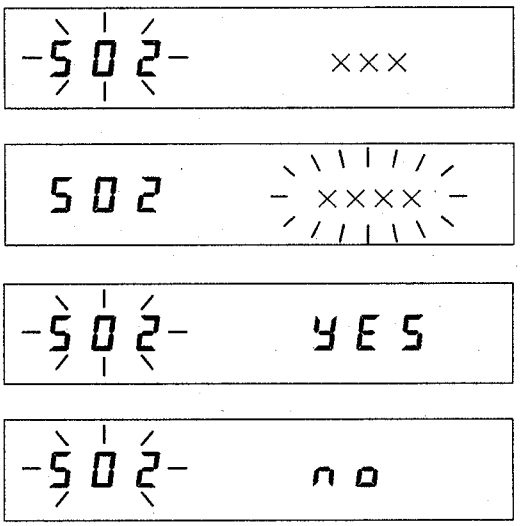
1. Go to the SYSTEM MENU (refer to section 2-24), and select "Battery end setting" mode (Menu No. 502).
2. Press the RESET (MENU SET) button to turn the voltage display part off then on, then input the desired voltage. with measured by digital voltmeter to the DC IN connector.
3. Press the RESET (MENU SET) button (the desired voltage is stored in EEPROM).
   When the desired voltage is stored, display "YES".
   If the value cannot be stored in EEPROM because of an error, display "no". In this case, repeat steps 1 to 3.

NOTE1: VTR operation stops at the voltage of battery end which is set.
The set voltage is 11.0 V

NOTE2: Be not the value shown in the voltage display part of LCD for reference.

NOTE3: When entering this menu by mistake, be sure to press the MENU button to quit the menu. To quit the menu, never press the RESET button. When pressing the RESET button, the data during setting must be written.

LCD Display
* XXX indicates the remaind time.



2-19-2. Changing the Voltage of Battery Before End/ End (2)

The voltage of the battery before end can also be changed without any equipments shown in the former item from the SYSTEM MENU as follows: However, to measure the voltage from the former item can be more accurate than to done from this item. Therefore, we recommend to done from the former item, section 2-19-1.

Range setting: 11.0 V to 12.5 V
Voltage of Battery before end: set to 11.3 V when shipped. (Battery almost exhausted)
Voltage of Battery end: set to 11.0 V when shipped. (Battery exhausted)
Standard value when shipped:

Voltage (V)	11.0	11.1	11.2	11.3	11.4	11.5	11.6	11.7	11.8	11.9	12.0
Standard value	b0	b5	bA	bF	C5	CA	CF	d4	d9	dE	E3

* The standard value might be different from every unit. The above value is a mean value.

Switch settings: TALLY: OFF
Setup: • Turn on the power.

[Battery before end setting mode]

1. Go to SYSTEM MENU (refer to section 2-24), and select "Battery before end setting" mode (Menu No. 501).
2. Press the RESET (MENU SET) button to turn the voltage display part off then on.
3. Press the SHIFT button with pressing the ADVANCE button.
4. Make a memo of the value as shown in the voltage display part.
5. Press the ADVANCE button or SHIFT button to change the voltage.

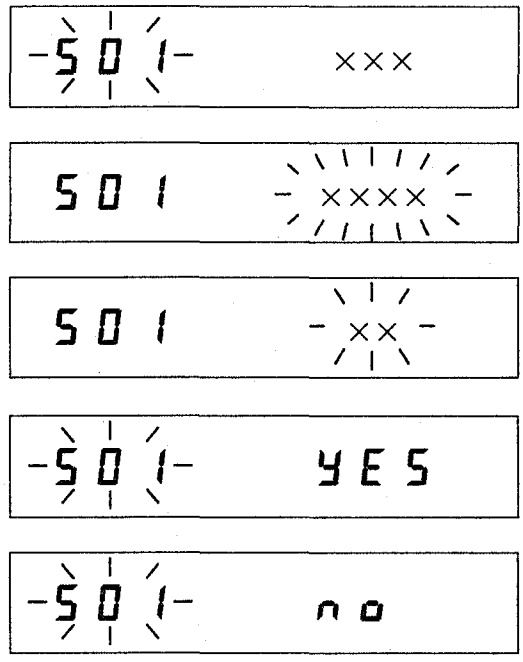
* Press the ADVANCE button to change value. Press the SHIFT button to shift a digit.
As a guide, to up one in the right digit is to rize about 0.02 V.

6. Press the RESET (MENU SET) button (the desired voltage is stored in EEPROM).
When the desired voltage is stored, display "YES". If the value cannot be stored in EEPROM because of an error, display "no". In this case, repeat steps 1 to 6.

NOTE 1: The value shown in the voltage display part of LCD is only for reference.

NOTE 2: When forgetting making a memo of the value, change the value with relative to the above standard value.

LCD Display
* XXX indicates the remaind time.



[Battery end setting mode]

1. Go to the SYSTEM MENU (refer to section 2-24), and select "Battery end setting" mode (Menu No. 502).
2. Press the RESET (MENU SET) button to turn the voltage display part off then on.
3. Press the SHIFT button with pressing the ADVANCE button.
4. Make a memo of the value as shown in the voltage display part.
5. Press the ADVANCE button or SHIFT button to change the voltage.

* Press the ADVANCE button to change value. Press the SHIFT button to shift a digit.
As a guide, to up one in the right digit is to rize about 0.02 V.

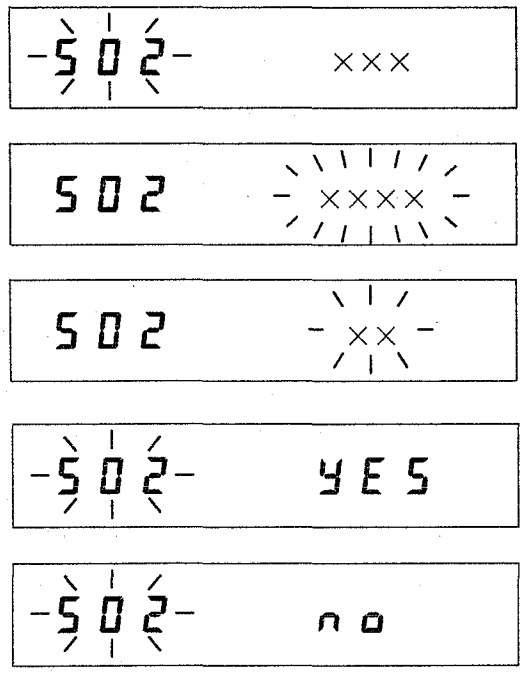
6. Press the RESET (MENU SET) button (the desired voltage is stored in EEPROM).
When the desired voltage is stored, display "YES". If the value cannot be stored in EEPROM because of an error, display "no". In this case, repeart steps 1 to 6.

NOTE 1: VTR operation stops at the voltage of battery end which is set. The set voltage is 11.0 V.

NOTE 2: Be not the value shown in the voltage display part of LCD for reference.

NOTE 3: When entering this menu by mistake, be sure to press the MENU button to quit the menu. To quit the menu, never press the RESET button. When pressing the RESET button, the data during setting must be written.

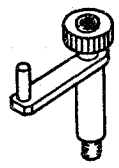
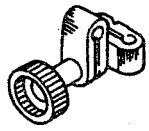
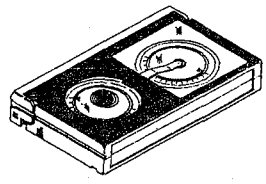
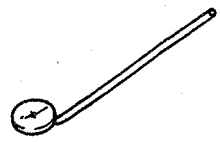
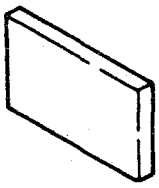
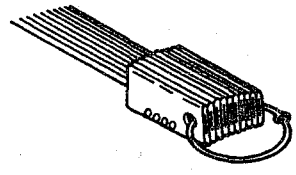
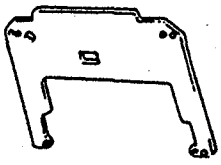
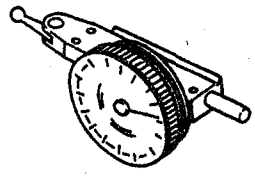
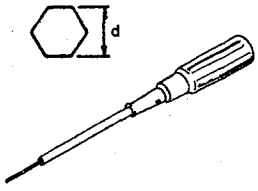
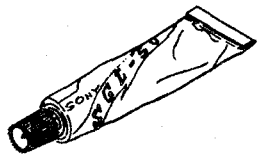
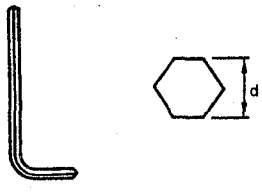
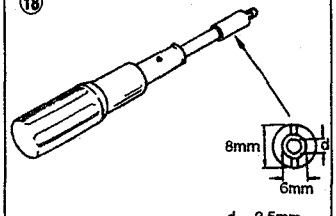
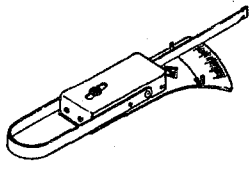
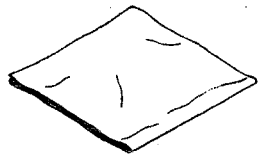
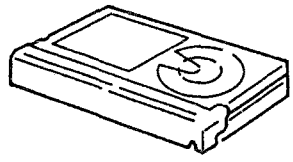
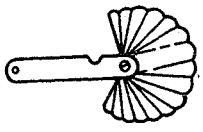
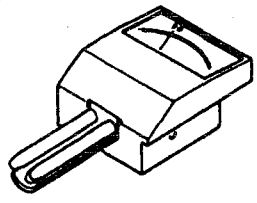
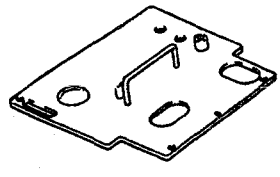
LCD Display
* XXX indicates the remaind time.



2-20. FIXTURES AND EQUIPMENTS

Fig No.	Part No.	Description	For use
1	J-6001-820-A	DRUM ECCENTRICITY GAUGE (3)	Upper drum eccentricity adjustment
2	J-6001-830-A	DRUM ECCENTRICITY GAUGE (2)	
3	J-6080-003-E	FWD BACK TENSION MEASUREMENT CASSETTE	FWD torque adjustment
4	J-6080-029-A	ADJUSTMENT MIRROR	Tape path adjustment
5	J-6086-570-A	PLATE, PARALLEL	Audio head zenith adjustment
6	J-6087-000-A	DRUM ECCENTRICITY GAUGE (5)	Upper drum eccentricity adjustment
7	J-6152-450-A	WIRE CLEARANCE CHECK GAUGE	Clearance check
8	J-6321-500-A	TAPE GUIDE ADJUSTMENT DRIVER	Tape guide height adjustment
9	J-6321-880-A	CASSETTE DUMMY COVER	Mechanical deck adjustment
10	J-6325-110-A	TORQUE DRIVER BIT (FOR M1. 4)	Parts replacement
11	J-6325-380-A	TORQUE DRIVER BIT (FOR M2)	Parts replacement
12	J-6325-400-A	TORQUE DRIVER (FOR 3 kg)	Parts replacement
13	J-6325-530-A	DRUM ECCENTRICITY GAUGE (6)	Upper drum eccentricity adjustment
14	J-6326-120-A	HEXAGON BIT (d = 1.5 mm)	Removal of the mechanical deck block
15	7-661-018-18	OIL	Parts replacement
16	7-662-010-04	GREASE SGL-505 (20 g)	Parts replacement
17	7-700-736-05	L-SHAPED HEXAGON WRENCH (d = 1.5 mm)	Parts replacement
18	7-700-742-02	JACK NUT SCREWDRIVER	Parts replacement
19	7-732-050-20	TENSION SCALE (50 g FULL SCALE)	Tension adjustment
20	7-741-900-53	WIPING CLOTH	Cleaning
21	8-960-096-01	ALIGNMENT TAPE, CR2-1B	Tracking alignment (for NTSC)
22	8-960-096-51	ALIGNMENT TAPE, CR2-1B PS	Tracking alignment (for PAL)
23	8-960-096-41	ALIGNMENT TAPE, CR5-1B	Video alignment (METAL)(for NTSC)
24	8-960-096-91	ALIGNMENT TAPE, CR5-1B PS	Video alignment (METAL)(for PAL)
25	8-960-097-44	ALIGNMENT TAPE, CR5-2A	Video alignment (OXIDE)(for NTSC)
26	8-960-098-44	ALIGNMENT TAPE, CR5-2A PS	Video alignment (OXIDE)(for PAL)
27	8-960-097-45	ALIGNMENT TAPE, CR8-1A	Audio alignment, TAPE Run adjustment (for NTSC)
28	8-960-096-86	ALIGNMENT TAPE, CR8-1B PS	Audio alignment, TAPE Run adjustment (for PAL)
29	9-911-053-00	THICKNESS GAUGE	Clearance check
30	9-919-573-01	CLEANING FLUID	Cleaning
31	Standard	TENTEL METER (T2-H7-UMC)	Tension adjustment
32	J-6325-360-B	FLATNESS CHECK GAUGE	Upper drum eccentricity adjustment, A/T head Adjustment

Note : TENTEL and TENTELOMETER are registered trademark of TENTEL Corp., 4475 Golden Foothill Pkwy El Dorado Hills, CA U.S.A.

① 	② 	③ 	④ 
⑤ 	⑥	⑦ 	⑧
⑨ 	⑩, ⑪	⑫	⑬ 
⑭ 	⑮	⑯ 	⑰ 
⑱ 	⑲ 	⑳ 	㉑ thru ㉘ 
㉙ 	㉚	㉛ 	㉜ 

2-21. USE OF CAMERA TOOL (EW-783)

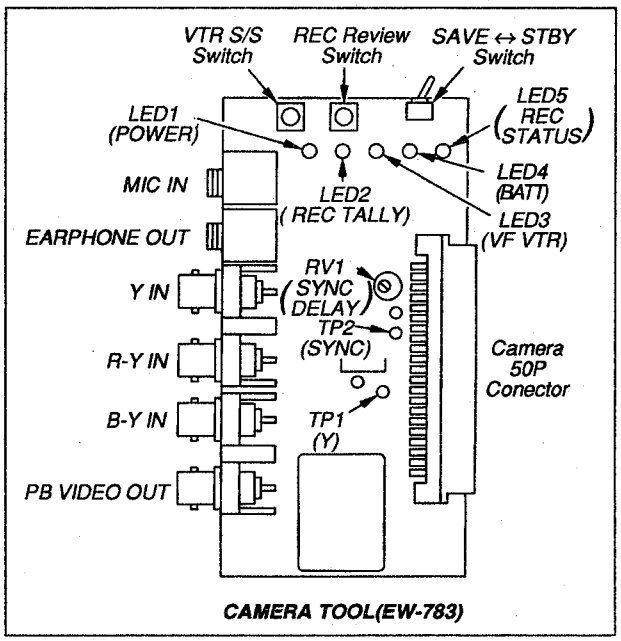
Camera tool has terminals of every kind component video signal input, play back video signal output, mic signal input and earphone output. This also has VTR S/S switch, REC REVIEW switch. SAVE → STBY switch and every kind of LED DISPLAY system.
When every kind component video signal is input during video system alignment, and when VTR is connected as follows to check with no camera during PVV-3/3P maintenance, use the camera tool.

1. Switch operation

VTR S/S Switch
This switch is VTR record start/stop switch. When this switch is pressed, recording starts. When this switch is pressed again, recording stops.

REC REVIEW Switch
When this switch is pressed, part of recorded portion plays back. Confirm recording display in PB VIDEO OUT display during waiting to record.

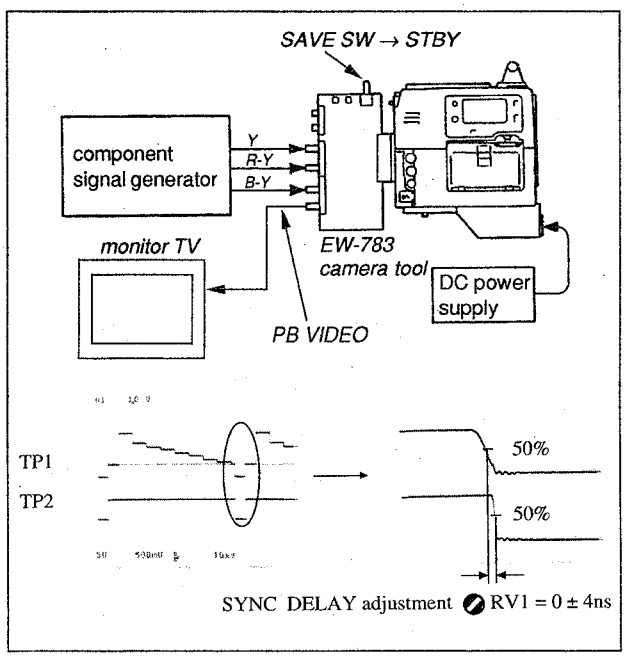
SAVE → STBY Switch
- SAVE
  VTR is in power-saving condition.
- STBY
  VTR is waiting to record. Press [VTR S/S] switch, and recording starts at once.



CAMERA TOOL(EW-783)

2. Camera Tool Connection and Alignment

When electrical alignments are performed with the camera tool, never fail to perform SYNC DELAY alignment connecting the camera tool as follows.



2-22. NOTES ON REPAIR PARTS

2-22-1. Notes on Repair Parts

(1) Safety Related Components Warning
Components marked with ## on the schematic diagrams, exploded views and electrical spare parts list are critical to safe operation. Replace these components with Sony parts whose part numbers appear in this manual or in service bulletins and service manual supplements published by Sony.

(2) Standardization of Parts
Repair parts supplied from Sony Parts Center may not be always identical with the parts which actually in use due to "accommodating the improved parts and/or engineering changes" or "standardization of genuine parts".
This manual's exploded views and electrical spare parts list are indicating the part numbers of "the standardized genuine parts at present".

(3) Stock of Parts
Parts marked with "o" SP (Supply Code) column of the spare parts list are not normally required for routine service work. Orders for parts marked with "o" will be processed, but allow for additional delivery time.

(4) Units for Capacitors and Resistors
The following units may be assumed in schematic diagrams, electrical parts list and exploded views unless otherwise specified.
Capacitors : μF
Resistors : W

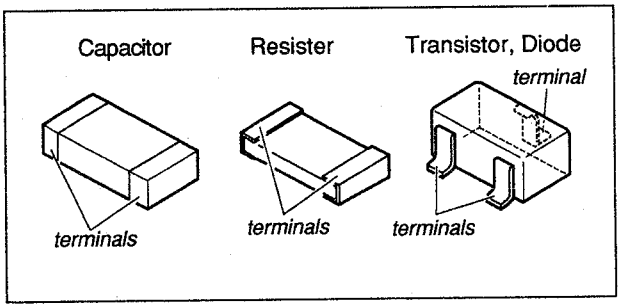
2-22-2. Replacement Procedure for Chip Parts

Required Tools

Soldering iron: 20W If possible, use a soldering iron tip heat-controller at 270 ± 10°C.
Braided wire : SOLDER TAUL or equivalent Sony part No. 7-641-300-81
Solder : 0.6 mm dia. is recommended.
Tweezers

Soldering Conditions

Soldering iron temperature: 270 ± 10°C.
Soldering time : less than two seconds per a pin.



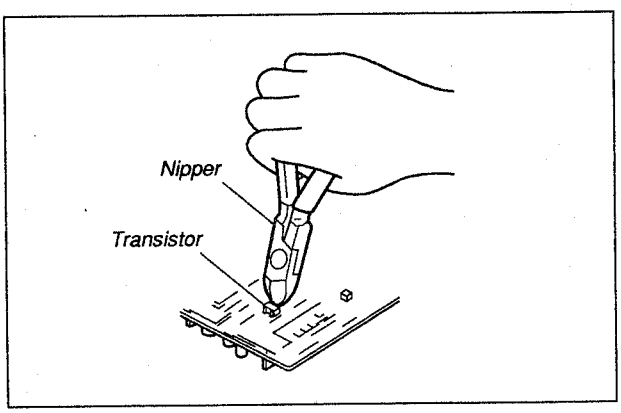
• **Resistor and Capacitor Replacement**

(1) Place the soldering iron tip onto the chip part and heat it up until the solder is melted. When the solder is melted, slide the chip part aside.
(2) Make sure that there is no pattern peeling, damage and/or bridges around the desoldering positions.
(3) After removing the chip part, presolder the area, in which the new chip part is to be placed, with a thin layer of solder.
(4) Place new chip part in the desired position and solder both ends.

NOTE: Once a chip part has been removed, never use it again.

• **Transistor and Diode Replacement**

(1) Cut the terminals of the chip part with a nipper.
(2) Remove the cut leads.
(3) Make sure that there is no pattern peeling, damage and/or bridges around the desoldering positions.
(4) After removing the chip part, presolder the area, in which the new chip part is to be placed, with a thin layer of solder.
(5) Place new chip part in the desired position and solder the terminals.



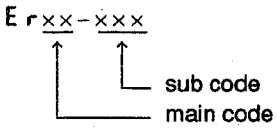
• **IC Replacement**

(1) Using the braided wire, "SOLDER TAUL" Sony Part No. 7-641-300-81, remove the solder around the pins of the IC-chip to be removed.
(2) While heating up the pins, remove the pins one by one using sharp-pointed tweezers.
(3) Make sure that there is no pattern peeling, damage and/or bridges around the desoldering positions.
(4) After removing the chip part, presolder the area, in which the new chip part is to be placed, with a thin layer of solder.
(5) Place new chip part in the desired position and solder the pins.

2-23. ERROR CODES

This set provides an error display function that displays the error if a trouble condition occurs.
When a failure is detected in the normal operating state, the error is immediately displayed on the display window.
And then,the warning indicator lights or blinks(4 Hz frequency) and the tally indicator blinks (4 Hz or 1Hz frequency).
In most cases, when an error occurs, the system enters the protective action and stops to operate.
Each error is displayed by its error code.
The contents of the error codes are as follows.

Error code display

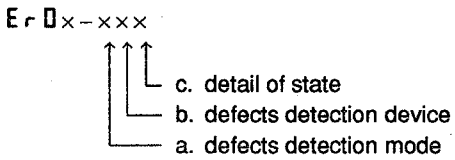


1. Main code
   The factors of error are divided into three classes.
   Er0× – ×××: defects around mechanism control
   Er3× – ×××: defects of sensor system
   Er91 – ×××: defects of CPU and around CPU

2. Sub code
   Sub code subdivides the factors of error.
   When the information of error codes are sufficiency, the sub code is "000".

   (1) Sub code of the defects around mechanism control

   Error code display



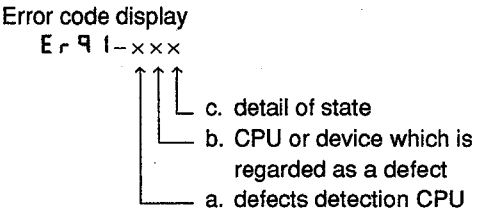
   a. Defects detection mode
      0: It cannot specify the mode.
      2: Threading mode
      3: STOP mode
      4: F FWD/REW mode
      6: PLAY/REC mode
      8: Unthreading mode

   b. Defects detection device
      2: Function Cam Motor / Cam Position Sensor
      3: Drum Motor / Drum FG
      4: Capstan Motor / Capstan FG
      5: Supply reel FG
      7: Take up reel FG
      9: Both supply and take up reals FGs

   c. Detail of state
      1: Operation cannot end within the fixed time.
      2: It detects the unusual speed.
      4: It can not detect the FG.
         (It detects the tape slack)

   (2) Sub code of defects of CPU and around CPU.

   Error code display



   a. Defects detection CPU
      1: System Control CPU (SS-57 board, IC1)
      2: LCD Control CPU (TC-86 board, IC1)
      4: Mechanism Control CPU (SS-57 board, IC201)

   b. CPU or device which is regarded as a defect
      1: System Control CPU (SS-57 board, IC1)
      2: LCD Control CPU (TC-86 board, IC1)
      3: EEPROM (SS-57 board, IC214)
      4: Mechanism Control CPU (SS-57 board, IC201)
      5: Time Code CPU (TC-86 board, IC10)
      7: EEPROM (TC-86 board, IC3)

   c. Detail of states
      5: Communication impossibility
      6: Read data check sum NG

Error code list

Error Code	TALLY Indicator	WARNING Indicator	Contents	Error detecting method	Possible failure
Er02-454 Er02-474 Er02-654 Er02-674 Er02-694	Blinks (4 Hz)	Blinks (4 Hz)	**No reel rotation / reel stoppage** • The reel table would not operate for a specific time in the reel operation mode; the tape protective action was executed.	The rotational speed obtained from the FG output of Supply or Takeup reel is zero for a specific time.	• Cut or coiling tape • Poor adjustment of tape tension/torque • Malfunction of capstan motor • Improper operation of pinch roller block assembly • Improper operation of brake assembly • Faulty circuit in reel FG system • Improper operation of reel brake • Cut tape • Looseness of set screws for securing the reel base assembly • Damaged reel base assembly
			Incorrect increase of reel rotational speed • The rotational speed of reel table became incorrectly faster in the reel operation mode;the tape protective action was executed.	The rotational speed obtained from the FG output of reel is more than the specified value for a specific time.	
			Reel motor won't stop • When the mode is switched from F FWD/ REW to STOP mode, the reel table would not stop within a specific time; the protective action was executed.	The rotational speed obtained from the FG output of reel was not zero in a specific time.	
			sub code 454: F FWD/REW mode Supply reel detected a failure. 474: F FWD/REW mode Takeup reel detected a failure. 654: Playback/record mode Supply reel detected a failure. 674: Playback/record mode Takeup reel detected a failure. 694: Both supply and take up reels detected failures.		
Er07-x42	Blinks (4 Hz)	Blinks (4 Hz)	**No capstan rotation** • The capstan motor would not operate for a specific time in the F FWD/REW mode; the tape protective action was executed.	The rotational speed obtained from the FG output of capstan motor is zero for a specific time.	• Poor adjustment of capstan free speed (capstan FG duty ratio) • Malfunction of capstan motor • Faulty circuit in capstan FG system • Break or poor connection of harness
Er08-x32	Blinks (4 Hz)	Blinks (4 Hz)	**No drum rotation/drum stoppage** • The drum motor would not rotate for a specific time in the drum rotation mode; the tape protective action was executed.	The rotational speed obtained from the FG output of drum motor is less than the specified value for a specific time.	• Tape coiling around drum • Break or poor connection of harness • Malfunction of drum motor • Faulty circuit in drum FG/PG system

Error Code	TALLY Indicator	WARNING Indicator	Contents	Error detecting method	Possible failure
Er09-221	Blinks (4 Hz)	Blinks (4 Hz)	**Failure in threading operation** • The threading operation was not completed within a specific time; the operation was stopped. (Switch from threading end state to STOPped state) (Switch from STOPped state to unthreading end state)	The threading operation was not completed in a specific time after commanded by system microcomputer.	• Failure in reel motor brake operation • Malfunction of threading motor • Improper gear position of threading unit • Improper detection by cam mode sensor • Break or poor connection of harness
Er09-821	Blinks (4 Hz)	Blinks (4 Hz)	**Failure in unthreading operation** • The unthreading operation was not completed within a specific time; the operation was stopped. (Switch from unthreading end state to STOPped state) (Switch from STOPped state to threading end state)	The unthreading operation was not completed in a specific time after commanded by system microcomputer.	
Er09-x21	Blinks (4 Hz)	Blinks (4 Hz)	**Operating mode was not executed.** • The specific operating mode was not executed after specific time (three seconds).	The input signal could not be received from cam position sensor because the function cam was not moved in a specific time (three seconds).	• Failure in reel motor brake operation • Malfunction of threading motor • Improper gear position of threading unit • Improper detection by cam mode sensor • Break or poor connection of harness
Er31-000	———	———	The tape top sensor detected the failure (the tape top sensor was detected tape top after SHORT FF state); the protective action was executed. PLAY, FFWD, EJECT, record commands are execute.		• Fault in tape top/end sensor • Break or poor connection of harness • Fault in detection circuit
Er32-000	———	———	The tape top sensor detected the failure (the tape end sensor was detected tape end after SHORT REW state); the protective action was executed. REW, EJECT commands are execute.		

Error Code	TALLY Indicator	WARNING Indicator	Contents	Error detecting method	Possible failure
Er91-12x	Blinks (4 Hz)	Lights	**Failure in communication between system control microcomputer and LCD control microcomputer.** • . The communication between system control microcomputer (SS-57 board, IC1) and LCD control microcomputer (TC-86 board, IC1) was impossible. After a few seconds, Normal actions (PLAY, F FWD, REW, EJECT, record commands) are executed, but tag recording and time code recording are not executed.	The system control microcomputer (SS-57 board, IC1) detected a failure in communication between system control microcomputer and LCD control microcomputer (TC-86 board, IC1).	• Fault in LCD control microcomputer (TC-86 board, IC1) • Break or poor connection of harness
Er91-14x	Blinks (4 Hz)	Lights	**Failure in communication between system control microcomputer and mechanism control microcomputer** • The communication between system control microcomputer (SS-57 board, IC1) and mechanism control microcomputer (SS-57 board, IC201) was impossible; the protective action was executed.	The system control microcomputer (SS-57 board, IC1) detected a failure in communication between system control microcomputer and mechanism control microcomputer (SS-57 board,I C201).	• Fault in mechanism control microcomputer (SS-57 board, IC201) or around circuit
Er91-21x	———	———	**Failure in communication between system control microcomputer and LCD control microcomputer.** • The communication between system control microcomputer (SS-57 board, IC1) and LCD control microcomputer (TC-86 board, IC1) was impossible.	The LCD control microcomputer (TC-86 board, IC1) detected a failure in communication between system control microcomputer (SS-57 board, IC1) and LCD control microcomputer (TC-86 board, IC1).	• Fault in system control microcomputer (SS-57 board, IC1) • Break or poor connection of harness
Er91-25x	———	———	**Failure in communication between LCD control microcomputer and time code microcomputer (TC-86 board, IC10).** • The communication between LCD control microcomputer (TC-86 board, IC1) and time code microcomputer (TC-86 board, IC10) was impossible.	The LCD control microcomputer (TC-86 board, IC1) detected a failure in communication between LCD control microcomputer and time code microcomputer (TC-86 board, IC10).	• Fault in time code microcomputer (TC-86 board, IC10)

Error Code	TALLY Indicator	WARNING Indicator	Contents	Error detecting method	Possible failure
Er91-27x	———	———	**Failure in communication between LCD control microcomputer and EEPROM.** • Check sum was NG when LCD control microcomputer (TC-86 board, IC1) read data from EEPROM (TC-86 board, IC3).	LCD control microcomputer (TC-86 board, IC1) detected the incorrect data in the contents of EEPROM data (TC-86 board, IC3).	• Fault in EEPROM (TC-86 board, IC3)
Er91-436	Blinks (4 Hz)	Lights	**Failure in data for mechanism control microcomputer adjustment.** • The check sum of adjustment data of mechanism control microcomputer (SS-57 board, IC201) was impossible.	The mechanism control microcomputer (SS-57 board, IC201) detected a failure in read data check sum from EEPROM (SS-57 board, IC214).	• Fault in EEPROM (SS-57 board, IC214)
Er92-000	———	———	The 1/2 VD signal could not be detected.	The LCD control microcomputer (TC-86 board, IC1) could not detect the 1/2 VD signal.	• Break or poor connection of harness

2-24. MENU

The settings of the system, adjustments and the settings of the VTR menus during maintenance can be determined using the LCD on this unit, There are three menus:

1. USER MENU
   For user operations.

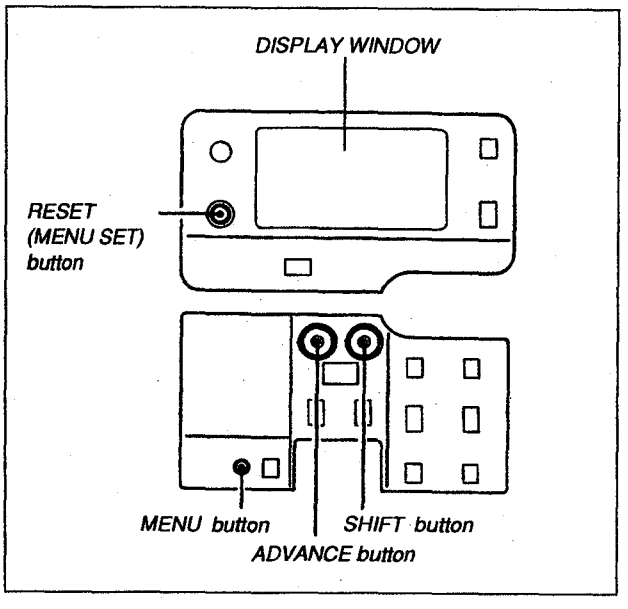
2. SYSTEM MENU
   Used to set up the system operations. (This menu is not for operators and is not described in the operation manual.)

3. MAINTENANCE MENU
   This menu is used when performing maintenance (including adjustments).

2-24-1. USER MENU

To make settings using the USER menu

1. Press the MENU button in the TC panel.



2. Press the ADVANCE button repeatedly to change the menu number in the LCD to the required menu number.

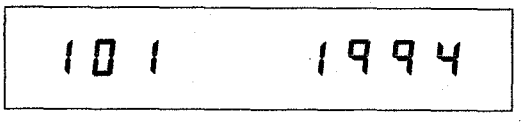
3. Press the SHIFT button to select the menu.
   The current setting appears, and the setting can be changed.

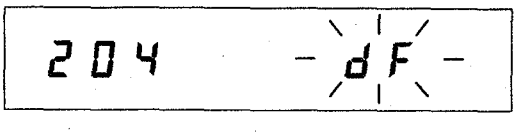
4. Press the SHIFT button to switch to the next portion to set, then press the ADVANCE button to change the value of the blinking numbers.

5. Press the RESET (MENU SET) button.
   The setting is registered and the menu number blinks again.

6. Press the MENU button.
   The LCD returns to the display before the USER menu.

The LCD indicates "101 1994", and the unit enters the USER menu.





☐ is the factory setting

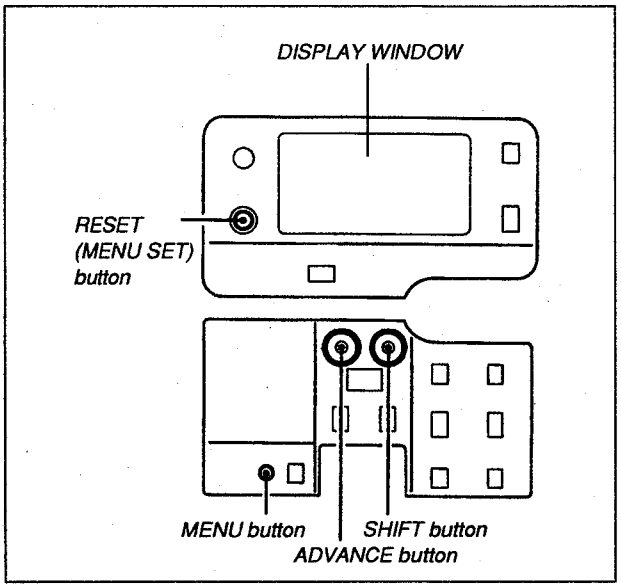
MENU No.	MENU DESCRIPTION	LCD/ FACTORY SETTING	CONTENTS
101	———	101 1994	Setting the real time clock and calendar
201	DRUM RUN METER	201 xxxx	Displaying the head drum/tape transport/total operation hours A:Head drum operating hours B:Tape transport operation hours C:Operating hours (Total with power on) ※ Select menu number 201,and press the SHIFT button. Pressing the SHIFT button cycles through the following displays. • Head drum operating hours • Tape transport operation hours • Operating hours (Total with power on) • Menu number indication
204	DF/NDF SELECT	204 dF [DF]/ NDF	Selectig drop-frame/non-drop-frame mode of time code generator NDF : Non-drop-frame DF : Drop-frame ※ NTSC only used.
206	ANTON BAUER	206 oFF	Changing ON/OFF of anton battery (Battery indicator and super light control)
207	STANDBY TIMER	207 08 1 / 3 / 5 / [8]	Sets the release time of standby mode to 1, 3, 5 or 8minutes.
208	VITC INSERT LINE	208 16 18 12 / 13 / 14 / 15 / [16] 17/ [18] / 19 / 20 / 21 22	Sets the insertion lines of VITC. The possible settings are in the range of 12 though 19 for PVV-3 and 9 though 22 for PVV-3P.
209	REAL TIME RECORDING FUNCTION	209 oFF ON / [OFF]	Records the real time on the VITC user bits.

Refer to section 1 on pages 1-27 to 1-28 for the USER menu.

2-24-2. SYSTEM MENU

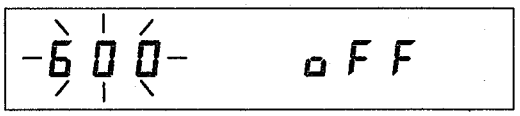
To make settings using the system menu

1. Press the MENU button while pressing the SHIFT button in the TC panel.

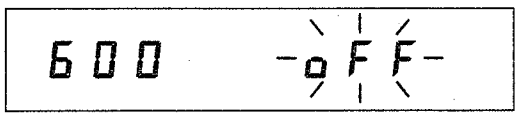


The LCD indicates "101 1994".

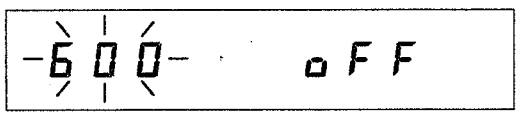
2. Release the SHIFT button while still pressing the MENU button.
   Confirm that the dispay indicates "600 OFF" after 1 second, then release the MENU button.
3. Press the ADVANCE button or SHIFT button to change the menu number in the LCD to the required menu number.
   Pressing the ADVANCE button (+ button) cycles through the following displays:
   600→301→302→303···509→600···
   Pressing the SHIFT button (– button) cycles through the following displays:
   600→509→503→502···301→600···



4. Select the required menu number, then press the RESET (MENU SET) button.
   The current setting appears,and the setting can be changed.



5. Press the ADVANCE button to change the value of the blinking number.
6. Press the RESET (MENU SET) button at the required menu number.
   The settings is registered and the menu number blinks again.



7. Press the MENU button.
   The LCD returns to the display before the SYSTEM menu.

☐ is the factory setting

MENU No.	MENU DESCRIPTION	LCD/ FACTORY SETTING	CONTENTS
303	DOLBY ON/OFF SELECT	303 on [ON] / OFF	Selects the DOLBY ON/OFF. ON : DOLBY ON OFF: DOLBY OFF **NOTE:** Switches on and off in menu mode only when S550 on the TC-86 board is set to "MENU". (Refer to Section 2-17 for setting of S550/TC-86 board.)
304	AUDIO CH1 ATTENUATOR ON/OFF SELECT	304 oFF ON / [OFF]	Selects the gain when audio input CH1 (XLR) at the rear is MIC. ON : Attenuated about 20 dBu (input sensitivity –60 dBu) Turn on when sound is distorted even if the volume is low. OFF: Normal level (input sensitivity –60 dBu)
305	AUDIO CH2 ATTENUATOR ON/OFF SELECT	305 oFF ON / [OFF]	Select the gain when audio input CH2 (XLR) at the rear is MIC. ON : Attenuated about 20 dBu (input sensitivity –40 dBu) Turn on when sound is distorted even if the volume is low. OFF: Normal level (input sensitivity –60 dBu)
306	VR CONTROL	306 oFF ON / [OFF]	Selects the AUDIO LEVEL knob on the panel or preset volume in the board to set the audio level volume. ON : Preset volume in the board Select when adjusting the audio input level. OFF: AUDIO LEVEL knob on the panel
307	LIMITTER ON/OFF SELECT	307 on [ON] / OFF	Switches the limiter on and off when the audio select switch (TC panel) is "MANU". ON : Limiter ON OFF: Limiter OFF
308	PHASE CORRECTION ON/ OFF SELECT	308 on [ON] / OFF	Selects to corrects the phase or not. ON : Corrects the phase OFF: Not corrects the phase
401	BACK TALLY MODE SELECT	401 oFF ON / [OFF]	Changing the real REC mode on and off. ON : REAL REC MODE OFF: REC MODE & WARNING DISPLAY
402	HUMID MODE SELECT	402 oFF ON / [OFF]	ON : When VTR is REC mode, REC continne to operate even if the VTR is numidified When VTR is other mode, ON is the same as OFF. OFF: HUMID ALARM is displayed to protect the tape when the unit is humidified, and the VTR stops for the period specified by the HUMID TIMER. (Refer to Section 2-10.)

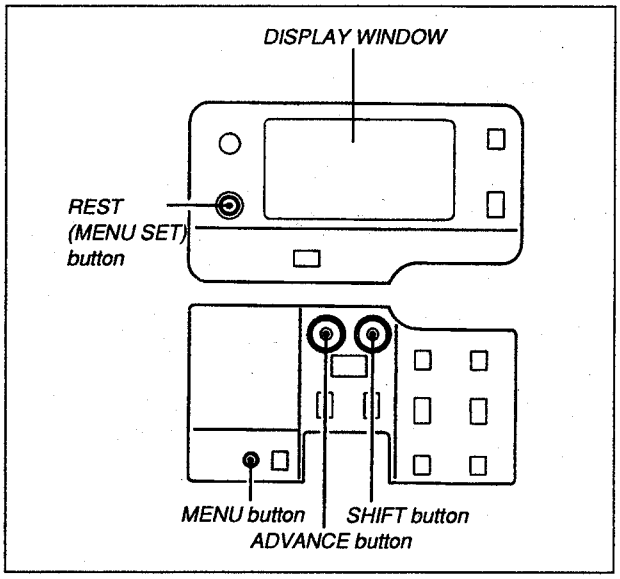
☐ is the factory setting

MENU No.	MENU DESCRIPTION	LCD/ FACTORY SETTING	CONTENTS
403	ROM VERSION DISPLAY	403 1.10	Displays the ROM version number of IC1 on the TC-86 board. For example shown in the left table: version number is 1.10.
404	VITC MENU ON/ OFF	404 on [ON]/ OFF	Switchs on and off the VITC INSERT LINE and REAL TIME RECORDING FUNCTION means. (menu No.208 and 209) ON : Displays the menus and the settings are changeable. OFF: Does not display the menus.
405	STANDBY OFF INHIBIT ON/OFF	405 oFF ON /[OFF]	Switchs on and off the standby off. ON : Inhibits the standby off, that is, not performs the standby off. OFF: Not inhibits the standby off, that is, performs the standby off.
501	BATTERY BEFORE	501 xxx	Sets the battery-before end voltage (voltage just before the battery loses its power to operate) from 11.0 to 12.5 V. (Refer to Section 2-19.)
502	BATTERY END	502 xxx	Sets the battery-end voltage (voltage when the battery loses its power to operate) from 11. 0 to 12. 5 V. (Refer to Section 2-19.)
503	J/UC/EK SELECT	J / UC / E	Switches the date format on the LCD. (Setting format of U-bit when TC mode switch 1 or TC panel is set to DATE/TIME.) When setting the U-Bit value, set TC mode switch 1 (TC panel) to the DATE/TIME to record the date on the time code track as follows. J : Year/Month/Day UC : Day/Month/Year EK : Month/Day/Year * The factory setting depends on the model type.
509	HUMID TIMER OFF	509 xxx	When HUMID MODE is off in factory setting menu No. 402, HUMID ALARM is displayed to protect the tape if the unit is humidified, and the VTR stops for a period specified by the HUMID TIMER. However, if the unit is dehumidified manually, the HUMID TIMER can be canceled in this menu. (Refer to Section 2-10.) **NOTE:** If the unit is still humidified, the timer cannot be canceled.
600	MAINTENANCE MENU ON/OFF SELECT	600 oFF ON /[OFF]	Switches on and off the maintenance menus (menu No. 601 to 607). ON : Displays the menus and the settings are changeable. OFF: Does not display the menus.

2-24-3. MAINTENANCE MENU

To use the MAINTENANCE menu

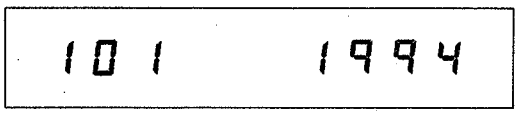
1. Press the MENU button to indicate "101 1994" while pressing the SHIFT button in the TC panel.



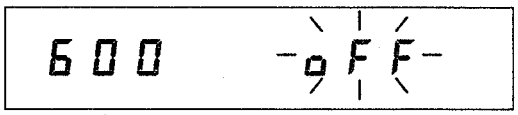
2. Release the SHIFT button still pressing the MENU button.

   Confirm that the dispay indicates "600 OFF" after 1 second, then release the MENU button.

The LCD indicates "101 1994".

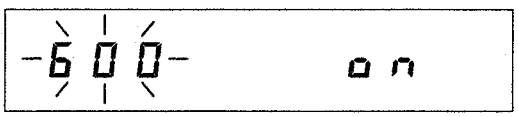


3. Press the RESET (MENU SET) button while the menu number 600 is being displayed. (OFF blinks)



4. Press the ADVANCE button and select "on".

5. Press the RESET button. (600 blinks)
   The unit enteres the maintenance menu (menu number 600-607).
   * When menu number 600 is set to "on", the SYSTEM menu is displayed and the settings can be changed.
6. Press the ADVANCE button to change the menu number in the LCD to the required menu number.
   Pressing the ADVANCE button (+ button) cycles through the following displays:
   600→601→602→603···509→600···
   Pressing the SHIFT button (– button) cycles through the following displays:
   600→509→503→502···301→600···



7. Press the RESET (MENU SET) button at the required menu number to set up and adjust each menu.
8. Press the MENU button.
   The LCD returns to the display before the SYSTEM menu.

*Turning the POWER switch off sets,menu number 600 to "OFF" automatically, even when set to "on".

□ is the factory setting

MENU No.	MENU DESCRIPTION	LCD/ FACTORY SETTING	CONTENTS
601	CAPSTAN SPEED ADJUSTMENT	601	Starts to automatically adjust the capstan speed by pressing the RESET (MENU SET) button. After adjustment, data is written to the EEPROM and the LCD displays the adjustment result (yes or no). (Refer to Section 9-1.)
602	STOP SERVO ADJUSTMENT	602	Adjusts the stop servo level with the FF button to increase the gain and REW button to decrease the gain.The FF and REW cannot be used during this adjustment.After adjustment, data is written to the EEPROM by pressing the RESET (MENU SET) button and the LCD displays the adjustment result (yes or no). (Refer to Section 9-2.) In this mode, the slack mute is on regardless of the slack mute setting on menu No.
603	SLACK MUTE SETTING	603 oFF ON / [OFF]	Switches the mute of the slack detection on and off. ON : Slack mute is on. An oxide tape can be used. OFF: Slack mute is off. Press the RESET (MENU SET) button and ADVANCE button to switch the slack mute on or off. **NOTE:**This setting is effective only when the power is turned on. After the power is turned off, the slack mute is automatically turned off.
604	TRACKING CONTROL	604	Controls the tracking using the FF and REW keys while playing. When the PLAY button is pressed, the tracking is reset to the center. The FF and REW operations are performed only in STOP mode. * It is possible to enter menu No.604 mode while playing or before playing.
605	SWITCHING POSITION ADJUSTMENT	605	Possible to adjust the switching position using the FF and REW keys while playing.When only the FF/REW button is pressed, the switching position is finely adjusted,when the PLAY + FF or REW keys are pressed, the switching position is coarsely-adjusted.The switching position can be moved only in playback mode.While this menu is selected, H-LOCK of the video is off.After adjustment, data is written to the EEPROM by pressing the RESET (MENU SET) button and the LCD displays the adjustment result (yes or no).The FF and REW operations can be performed in STOP mode. (Refer to Section 6.) * It is possible to enter menu No.605 mode while playing or before playing.

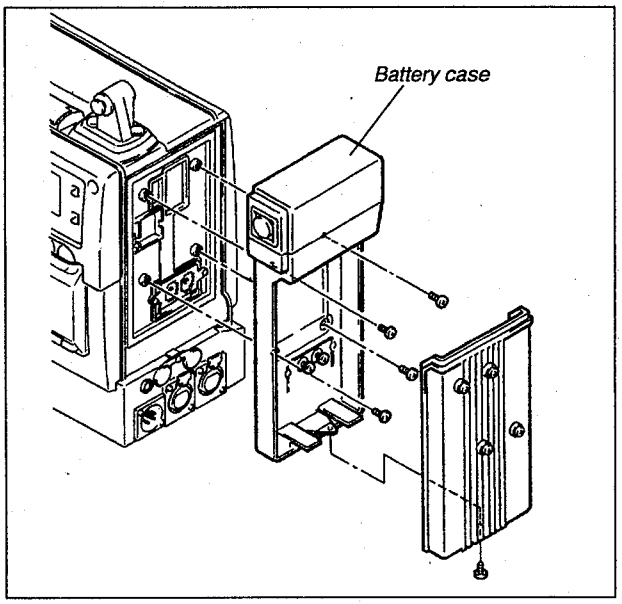
2-25. ANTON BAUER OPERATION

The following functions can be added to the PVV-3 series VTR by mounting the Anton Bauer gold mount QR-SP400A/DC-400A.

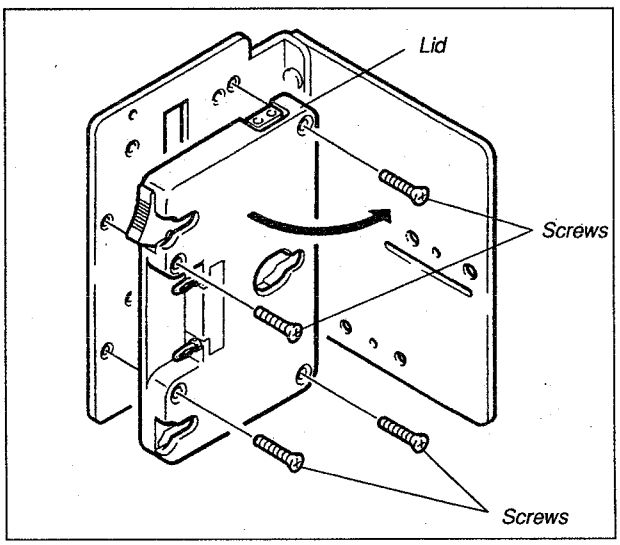
- Automatic light system — System which automatically lights up and turns off the Anton Bauer Ultralight System according to the VTR recording start and stop timings of PVV-3/3P VTR.
- Battery remainder display system — The Anton Bauer super magnum series battery is equipped with a battery remainder system. Battery remainder information is also output to the PVV-3/3P VTR via the gold mount. This information is displayed on the LCD display of the VTR (PVV-3/3P) and inside the VF of the camera (DXC-637 and so on).

2-25-1. Mounting

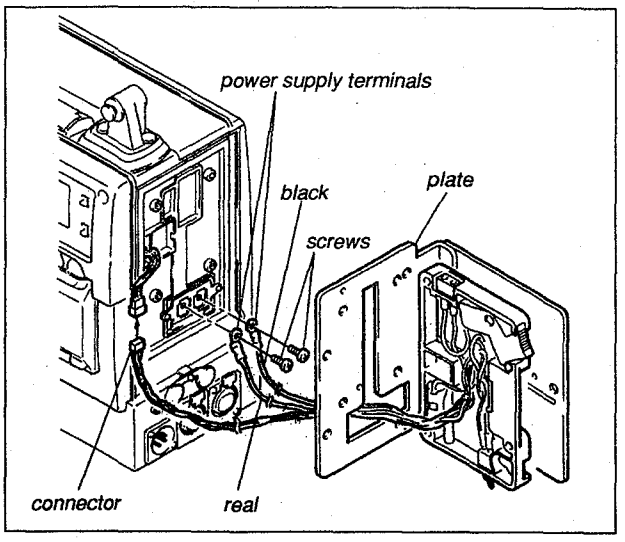
1. Remove the battery case for NP-1B mounted on PVV-3/3P.



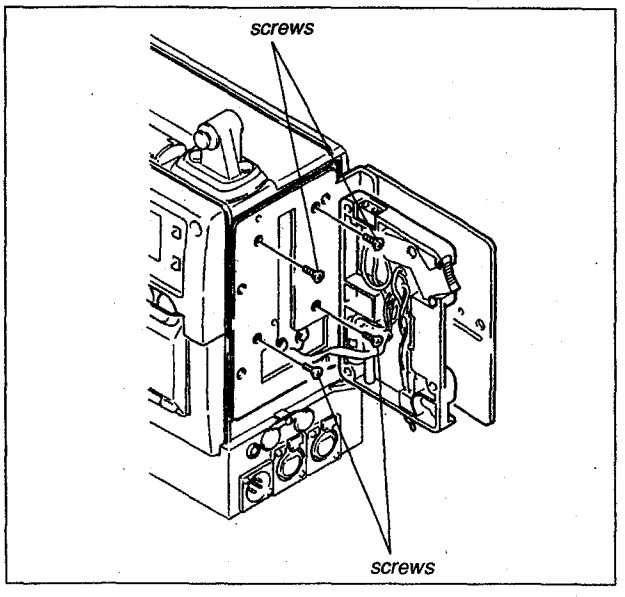
2. Remove the cover of the Anton Bauer gold mount.



3. Pull out the harness (3-pin) of the VTR from the storage pocket, connect it to the harness of the gold mount, and keep the connector and remaining part of the harness in the storage pocket. Screw the power supply terminal of the gold mount onto the battery terminal of the VTR. Pay special attention to the polarities.



4. Screw the plate of the gold mount onto the VTR. Place back the cover onto the gold mount in the reverse order of 2. Make sure the harness does not get caught for both steps.



2-25-2. Modification of VTR Settings

The modes that can be used for the Anton Bauer can be specified using the VTR menu of PVV-3/3P. Refer to Section 2-24-1 of this manual, operate menu No. 206 and set the display to "206 on". This switches the LCD display of the VTR (PVV-3/3P) and battery remaining display inside the VF of the camera (DXC-637 and so on) to the remaining display information sent from the battery when the super magnum series battery is used.

2-25-3. Automatic Light System Operations

The PVV-3/3P outputs the ultra light system ON/OFF control signal regardless of the settings of menu 206. The ON signal is output 1-2 frames before the actual start of recording and stops at the same time recording completes.

2-25-4. Battery Remaining Display

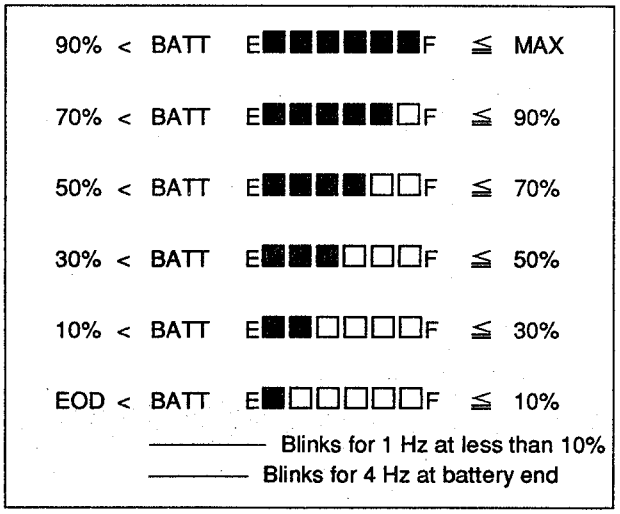
The super magnum series battery calculates the amount of electricity (stored) remaining in the battery while observing the charging and discharging conditions. The amount remaining will be displayed in %. The following is displayed on the LCD display of the VTR (PVV-3/3P) and in the VF of the camera (DXC-637 and so on).

* While the power supply is connected to the DC IN terminal, the original remaining amount will be displayed regardless of the settings of menu 206.

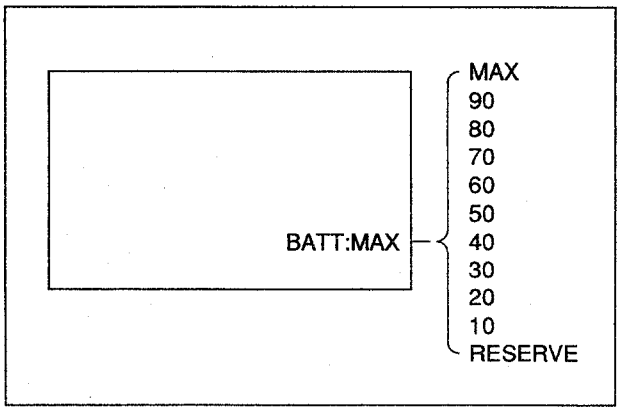
* The battery before end state indicates that there is less than 10% of battery remaining according to the remaining information from the super magnum series battery. At this time, the BATT on the LCD display and dot at the most left side blink for 1 Hz.

* The battery end voltage will be the voltage set shown in 2-19 regardless of the setting of menu 206. The BATT on the LCD display blinks for 4 Hz.

• LCD Display of VTR


90% < BATT E■■■■■■F ≦ MAX
70% < BATT E■■■■■□F ≦ 90%
50% < BATT E■■■■□□F ≦ 70%
30% < BATT E■■■□□□F ≦ 50%
10% < BATT E■■□□□□F ≦ 30%
EOD < BATT E■□□□□□F ≦ 10%
Blinks for 1 Hz at less than 10%
Blinks for 4 Hz at battery end

• Display Inside Camera VF



* Messages from the VTR warning system (warning message:Center-top of VF screen.Refer to page 4-10 of instruction manual) are displayed separately from the battery remaining information from the super magnum series battery. (Refer to " LCD Display of VTR ")

* Displays at the bottom right of the VF screen. Displays constantly when the test signal (color bar) and camera status are displayed. Displays when the amount of battery remaining drops below 10% for camera images.

  When the battery remaining drops below 10%:
  <BATT:10> lights up for 5 to 10 seconds according to the upgraded version specifications.

  When the battery remaining is 0:
  <RESERVE> blinks for 4 Hz constantly according to the upgraded version specifications.

- Anton Bauer, QR-SP400A/DC400A GOLD MOUNT, ULTRALIGHT SYSTEMS is the company name and registered trademark of Anton Bauer USA. This manual has been compiled with approval from Anton Bauer USA.
- Sony will not bear any responsibilities for Anton Bauer products. Contact Anton Bauer USA or an Anton Bauer dealer should you have any questions regarding their products.

SECTION 3
PERIODIC MAINTENANCE AND INSPECTION

3-1. MAINTENANCE TIME TABLE

The times in the tables, indicating when parts are to be replaced, are not time guarantee for parts. Use these times as references for drawing up maintenance and inspection schedules for extending the life of the unit and tape use.
The time to replace parts differs according to the environments and conditions in which the unit is being used.

♦: Replace ○: Clean

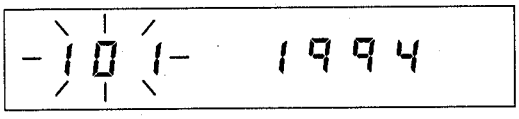
ITEM	Part No.	HOURS METER MODE	500 (H)	1,000 (H)	1,500 (H)	2,000 (H)	2,500 (H)	3,000 (H)	3,500 (H)	4,000 (H)	4,500 (H)	5,000 (H)	5,500 (H)
Upper drum ass'y (For NTSC)	A-8263-081-	A	♦	♦	♦ *2	♦	♦	♦ *2	♦	♦	♦	♦	♦
Upper drum ass'y (For PAL)	A-8263-083-	A	♦	♦	♦ *2	♦	♦	♦ *2	♦	♦	♦	♦	♦
Drum ass'y (For NTSC)	A-8263-080-	B	–	–	♦	–	–	♦	–	–	♦	–	–
Drum ass'y (For PAL)	A-8263-082-	B	–	–	♦	–	–	♦	–	–	♦	–	–
Slip ring ass'y	A-8267-886-	A	–	♦	–	♦	–	♦	–	♦	–	♦	–
Brush ass'y	A-6050-648-	A	–	♦	–	♦	–	♦	–	♦	–	♦	–
Tension regulator band ass'y	X-3722-325-	B	–	♦	–	♦	–	♦	–	♦	–	♦	–
S soft brake ass'y	X-3722-324-	B	–	♦	–	♦	–	♦	–	♦	–	♦	–
T soft brake ass'y	X-3722-323-	B	–	♦	–	♦	–	♦	–	♦	–	♦	–
S idler ass'y	A-6740-092-	B	–	–	–	–	–	♦	–	–	–	–	–
T idler ass'y	A-6740-091-	B	–	♦	–	♦	–	♦	–	♦	–	♦	–
Pinch roller	X-3722-363-	B	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦
Timing belt	3-722-452-	B	–	–	♦	–	–	♦	–	–	♦	–	–
Gear ass'y	X-3722-306-	B	–	♦	–	♦	–	♦	–	♦	–	♦	–
Slant table (rail)	3-725-214- 3-725-215- 3-725-217- 3-725-218-	B	–	○	–	○	–	♦	–	○	–	○	–
Loading cam gear	A-6737-190- A-6750-231- A-6750-233-	B	–	–	–	–	–	♦	–	–	–	–	–
Threading motor	1-698-346-11	B	–	–	♦	–	–	♦	–	–	♦	–	–
Capstan motor	1-698-345-12	B	–	–	♦	–	–	♦	–	–	♦	–	–
Full erase head	8-825-772-62	B	–	–	♦	–	–	♦	–	–	♦	–	–
CTL head	8-825-560-41	B	–	–	♦	–	–	♦	–	–	♦	–	–
AU head	8-825-779-51	B	–	♦	–	♦	–	♦	–	♦	–	♦	–

(NOTE) 1.HOURS METER MODE ··· A : Drum Running Meter B : Tape Running Meter C : Operation Meter
*2.When replacing the drum assembly, replace the upper drum, slip ring, and brush assemblies as well.

3-2. HOURS METER

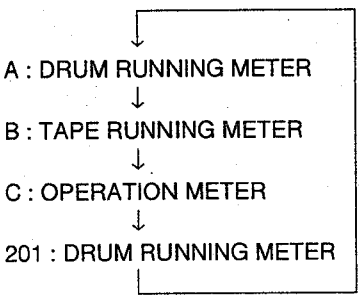
The hour meter is in the MENU mode.
It displays the total number of hours the unit has been power on, the total number of hours the drum has been rotating, and the total number of hours the tape has been running on the display window on the side.
It is recommended that this hour meter be used as a reference in maintenance.
Display the hour meter using the following method.

1. Press the MENU switch on the side panel with the tip of mechanical pencil or similer object to set the following display.
   (Example)



2. Press the ADVANCE switch to set the DRUM RUNNING mode.
   (Example)

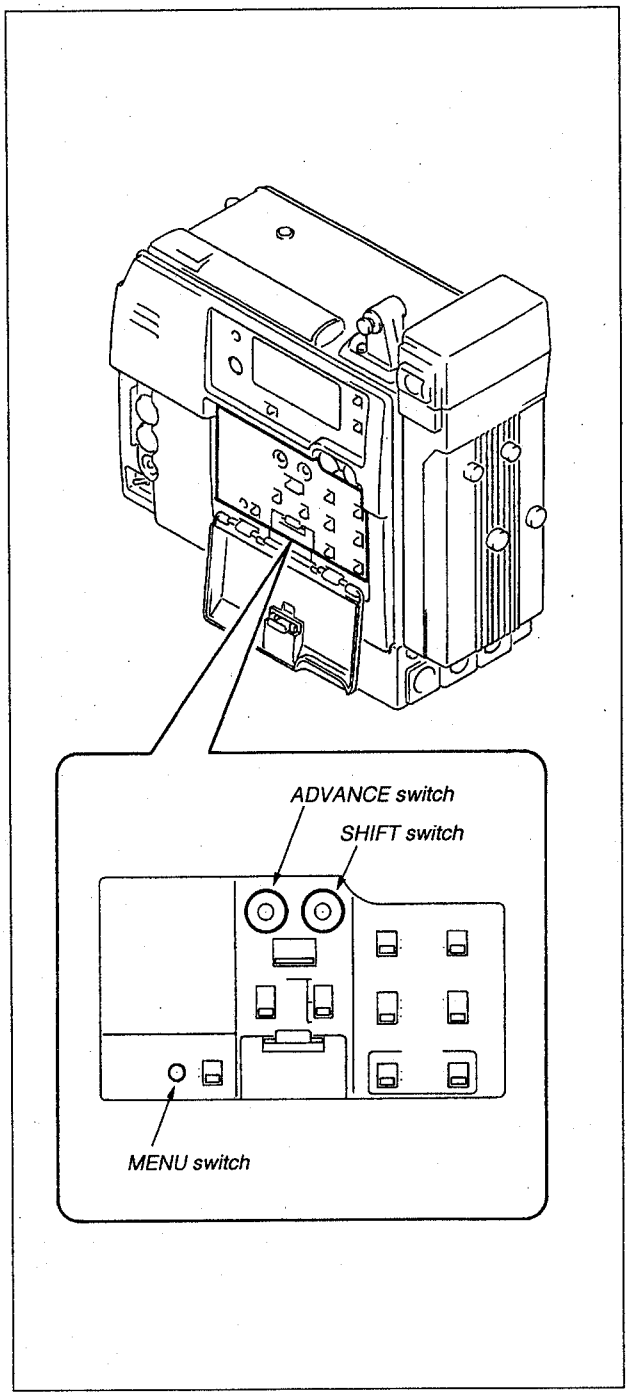
3. The display will change as follows each time the SHIFT switch is pressed.



Example : A
This indicates that the drum has been rotating for a total of 150 hours.

4. To end the MENU mode, press the MENU switch again.

(Note) When replacing the TC-86 board, be sure to replace the non-volatile memory (IC3).



3-3. MAINTENANCE AFTER REPAIRS

Perform the following maintenance after repairs regardless of the number of hours the unit has been operating.

1. Clean the video head and stationary heads.
2. Clean the tape running areas.

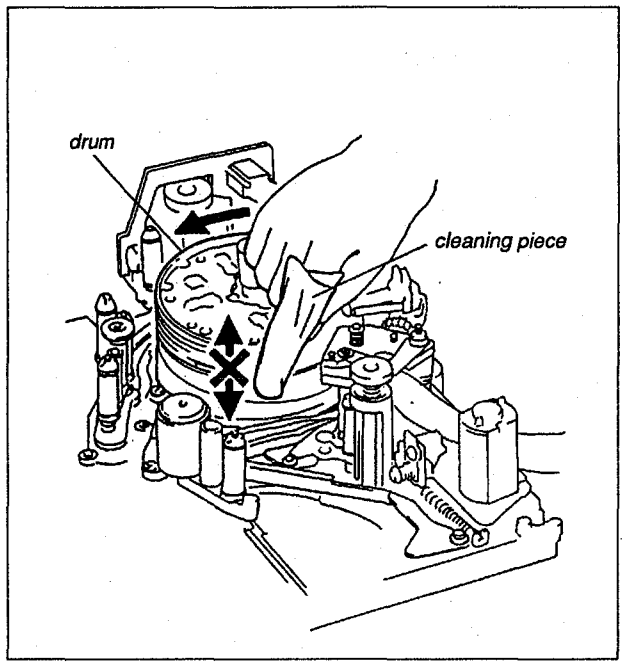
3-4. CLEANING PROCEDURE

Remove the Cassette-up Compartment for cleaning. (Refer to Section 4-2.)
Cleaning procedures are as follows. Be sure not to insert a cassette tape before the cleaning fluid evaporate completely.

3-4-1. Video Head

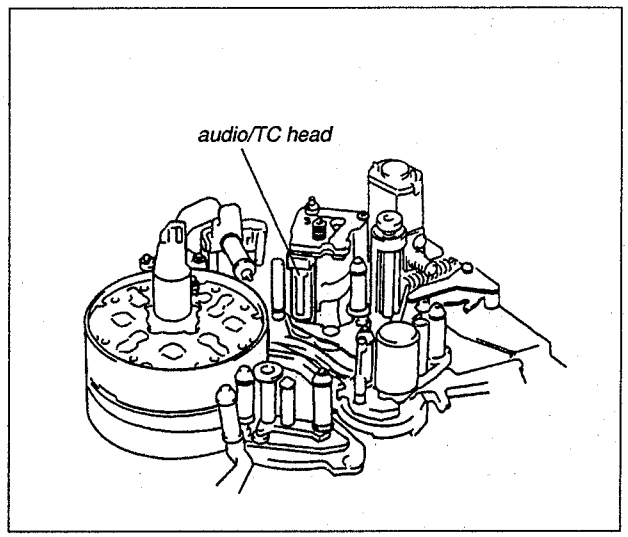
Press the cleaning piece moistened with the cleaning fluid and turn the drum slowly with hand.

(NOTE) • Never move the cleaning piece in the vertical direction of the head tip during cleaning.
• Clean the head with the power OFF.



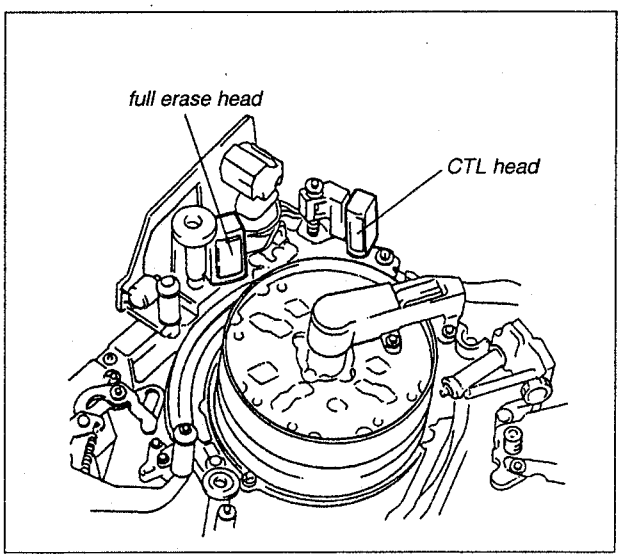
3-4-2. Audio/TC Head

Clean with the cleaning piece moistened with the cleaning fluid.



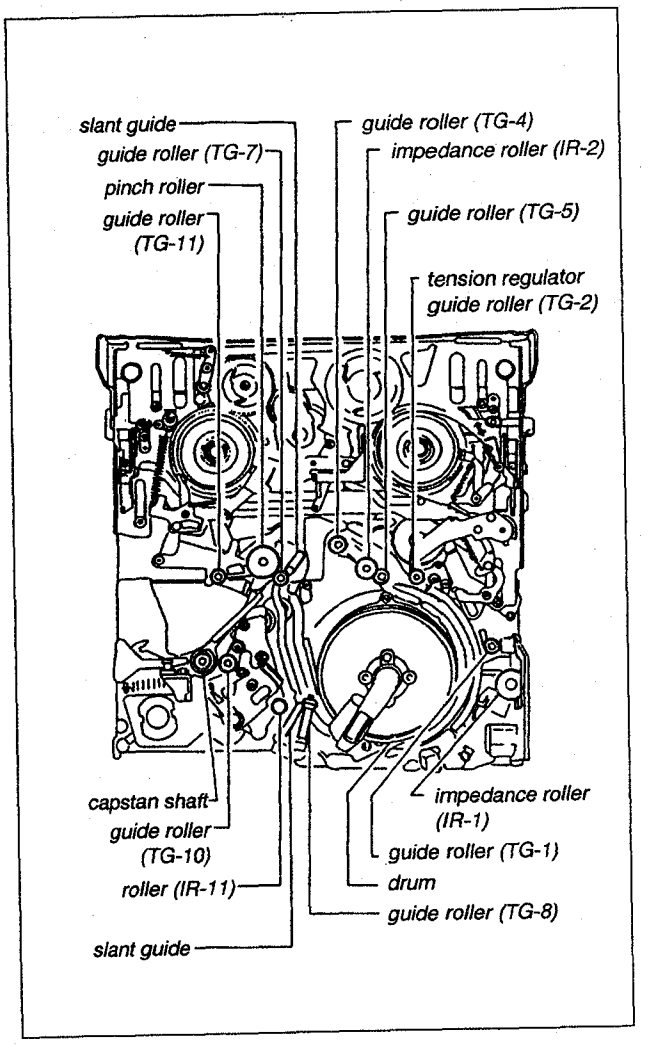
3-4-3. CTL, FE (Full Erase) Heads

Clean with the cleaning piece moistened with the cleaning fluid.



3-4-4. Tape Movement Areas

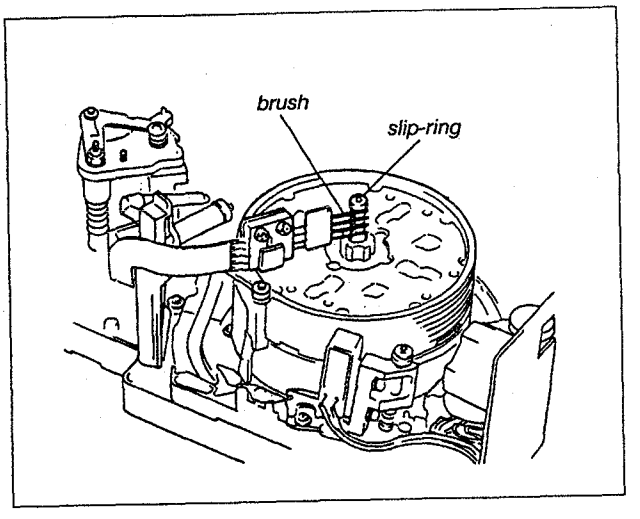
Clean with the cleaning piece moistened with the cleaning fluid; Tape guides, drum, capstan and the pinch roller as shown in the figure.



3-4-5. Slip-rings and Brushes

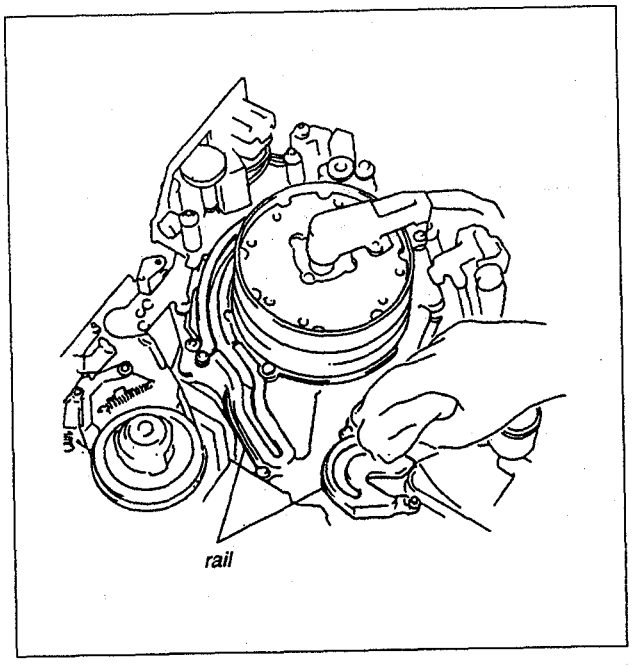
The Head Drum Assembly Slip-rings and Brushes do not require periodic cleaning.
However, if dust adheres to the Slip-rings or Brushes, clean them with the Soft brush which has short hairs. If this brush can not be obtained, use a Blower brush and Cotton Swab.

(NOTE) • Do not use alcohol as a cleaning fluid. If the Slip-ring and the Brushes are cleaned with alcohol, the surface tends to attract material which may increase the resistance at the contact area.
• Do not use conductive grease.



3-4-6. Rail

Clean with the cloth moistend with the alcohol.



rail

3-5. AFTER USED AT SEASIDE OR DUSTY AREAS

It is recommended to check the following items after the news gathering at seaside or dust areas.

1. Clean off sand and other dust in the unit with a cleaning piece moistened with the cleaning fluid, or blow off with an air-brush carefully.
2. Clean the video head and sationary heads with a cleaning piece moistened with the cleaning fluid.
3. Clean the tape movement areas (the drum surface, tape guides, capstan shaft and the pinch roller) with a cleaning piece moistened with the cleaning fluid.
4. Clean the upper of chassis of the unit.
5. Clean the surface of the reel tables contacting with the brake shoes.
6. Rotate by hand and move the tape guides, pulley, capstan and the pinch roller, and check that any abnormal noise sounds or not. If there sounds a noise, replace the part immediately.
7. After the news gathering at seaside, remove the printed circuit board.
   Clean the printed circuit board with a cleaning piece moistened with the cleaning fluid after blow off sand on the completely. Then clean the soldering side in the same manners.
8. Clean the connector on the connector panel completely.
9. Perform the operation check and be sure that the machine operates normally.

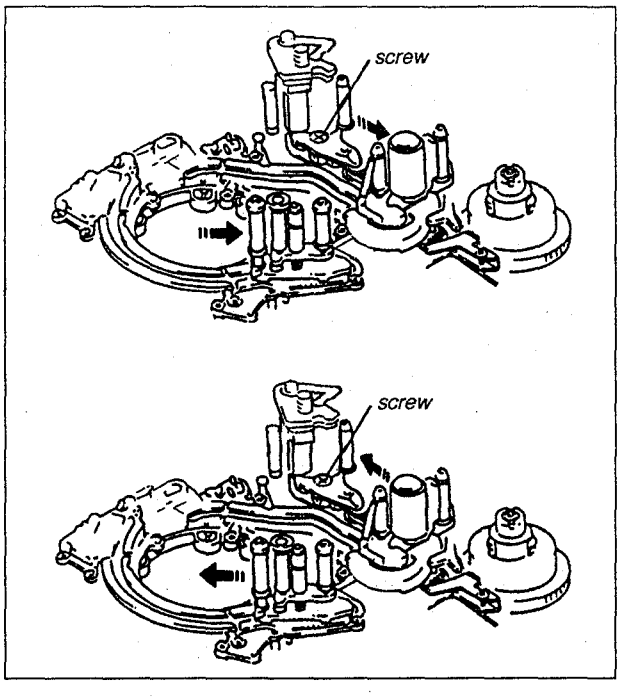
SECTION 4
REPLACEMENT OF THE MAJOR PARTS

4-1. PRECAUTIONS WHEN REPLACING PARTS

1. The mode of the unit when replacing parts is described in the Parts Replacement. The following is the description of the modes.

- EJECT: In this mode, the Pinch Roller, Tension Regulator Arm, T Base, and S Base have all completely returned to the reel table side.
  This condition can be set by turning the screw shown in the figure counterclockwise.

- Threading end:
  In this mode the Pinch Roller is placed in front of the Capstan Shaft, the T Base and S Base are in the positions of the T Support Bracket and S Support Bracket, and the Tension Regulator Arm is completely open.
  This condition can be set by turning the screw shown in the figure clockwise.



2. Replace parts with the VTR installed onto the unit, unless otherwise specified. At that time, remove the cover of the Cassette-up Compartment. (Refer to Section 4-2.)

3. The polyslider washers used to fix parts should not be used again once they have been removed. Use a new one after replacement.
   When installing a polyslider washer to the shaft, push the polyslider washer until the space between it and the part is about 0.1 to 0.2mm.
   1.2mm diameter polyslider washer:
   3-559-408-11
   1.5mm diameter polyslider washer:
   3-321-813-01

4. When tightening screws, be sure to keep the tightening torque. The torque driver and bits are provided.
   J-6325-400-A Torque driver (for 0.3N•m)
   J-6325-110-A Torque driver bit (for M1.4)
   J-6325-380-A Torque driver bit (for M2)

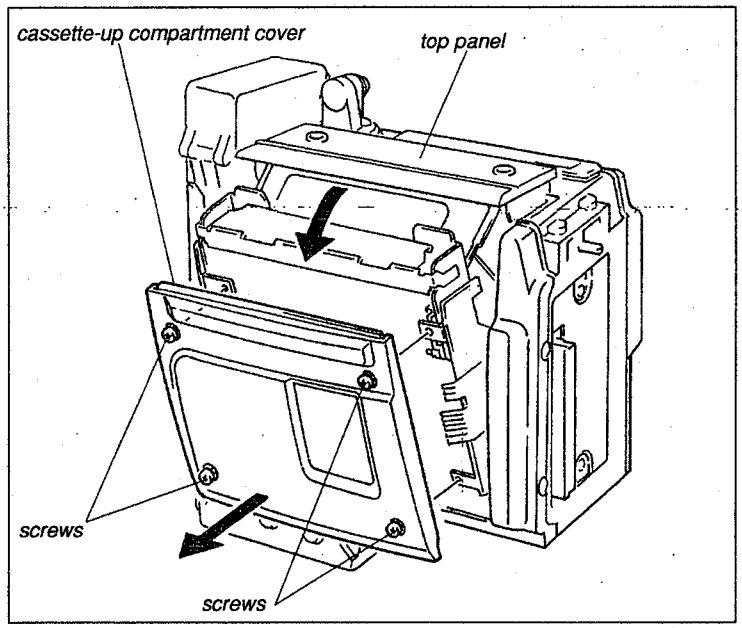
   Tightening torque
   1.4mm dia.screw: 0.09 ± 0.01N•m{0.9 ± 0.1kg•cm}
   2mm dia.screw: 0.3 ± 0.05N•m{3.0 ± 0.5kg•cm}

4-2. REPLACEMENT OF CASSETTE-UP COMPARTMENT

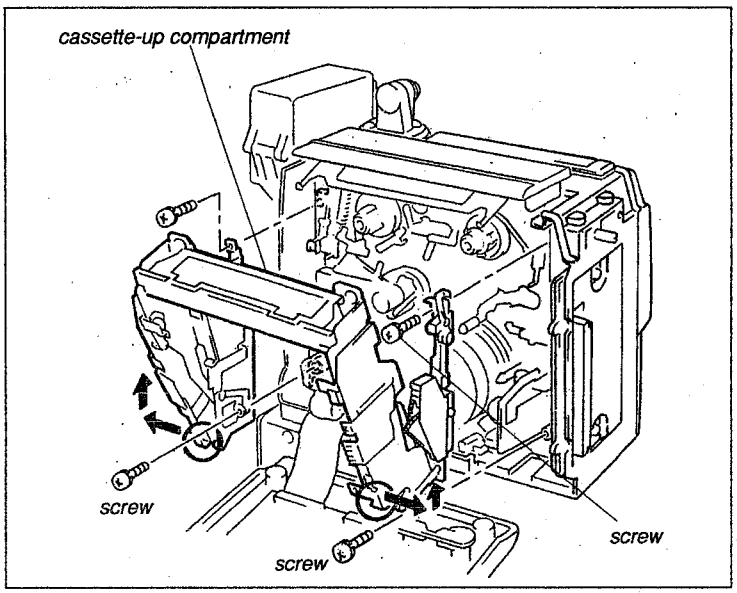
Mode: EJECT

Replacement procedure:

1. Loosen the screw shown in the figure and remove the cover of the Cassette-up Compartment.
   (Note) The AU Board is attached to the cover of the Cassette-up Compartment and the two flexible cables are connected to this AU Board. Be careful not to damage them.



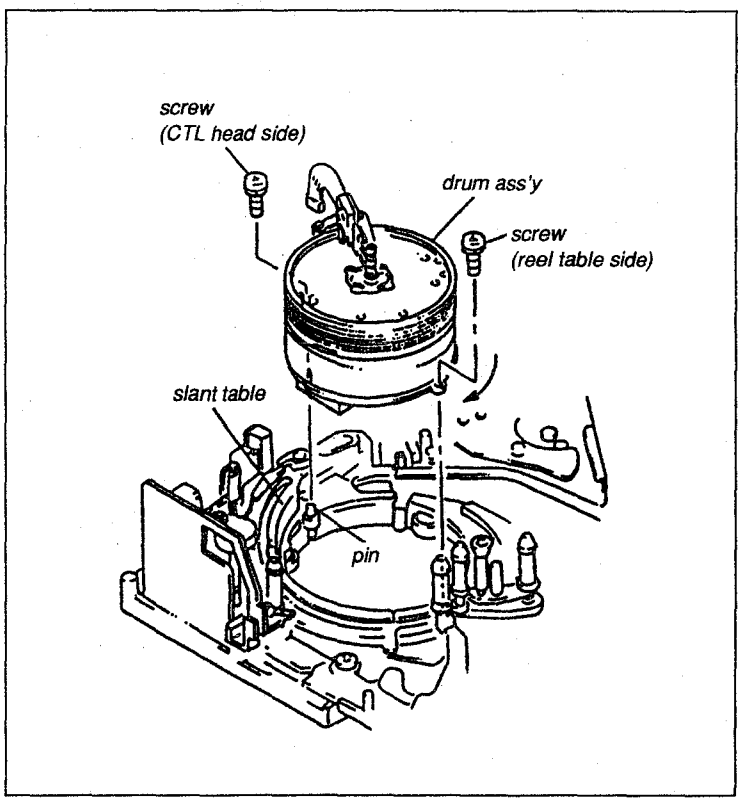
2. Remove the four screws attaching the Cassette-up Compartment, move the compartment in the direction of the arrow and remove it.
3. Attach the new Cassette-up Compartment in the reverse order of steps 1 and 2 .
4. Close the cover of the Cassette-up Compartment and check that the top panel descends smoothly.



4-3. REPLACEMENT OF THE DRUM ASSEMBLY

Tool: Tweezers
Mode: EJECT
Replacement procedure:

1. Disconnect the flexible board (FL-54 Board) of the Slip Ring which is connected to CN28 on the MB-552 Board with a pair of tweezers. (Refer to Section 2-13.)
2. Remove the two fixing screws of the Drum Assembly and remove the Drum Assembly from the unit. When removing, raise the Drum Assembly straightly up because the connectors at the bottom of the drum are inserted in CN650 and CN651 of the DR-254 Board.
3. Install the new Drum Assembly in the unit so that the Slant Table Pin is inserted into the hole of the new Drum Assembly.
4. Push the Drum Assembly against the direction of arrow so that the Drum Assembly is free of play and tighten the fixing screw at the Reel Table side. Then, tighten the fixing screw at the CTL Head side.
5. Insert and lock the flexible board (FL-54 Board) of the Slip Ring into connector CN28 on the MB-552 Board with tweezers. (Refer to Section 2-13.)
6. After replacement, perform the adjustments in Section 4-39.



4-4. REPLACEMENT OF THE UPPER DRUM ASSEMBLY

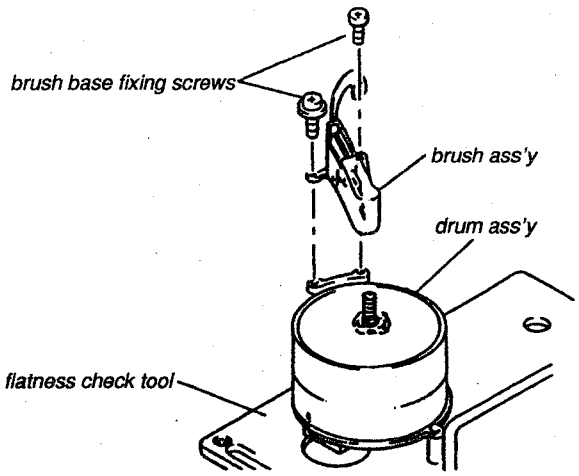
• When replacing the Upper Drum Assembly, be careful not to touch the Video Head.

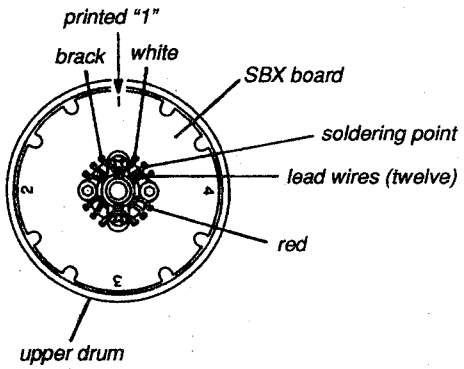
Tool: Flatness check tool
Drum eccentricity gauge (3)
Drum eccentricity gauge (2)
Drum eccentricity gauge (6)
Tweezers
L-shaped hexagonal wrench (across flat has 1.5mm)

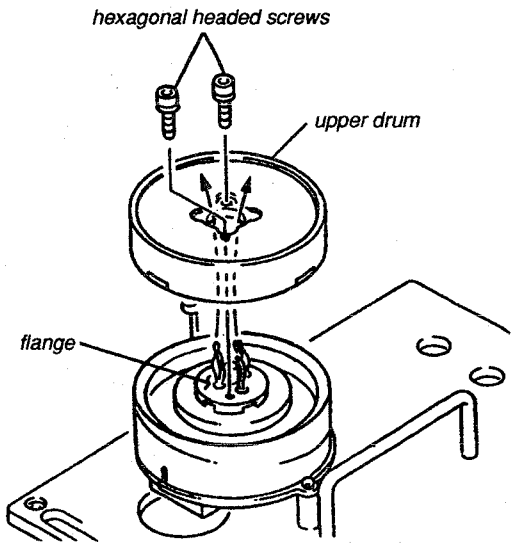
Mode: EJECT

Replacement procedure:

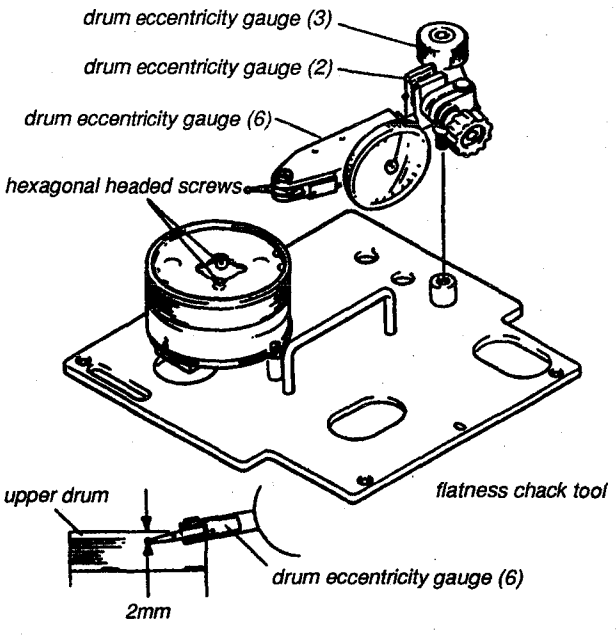
1. Remove the Drum Assembly from the unit as described in Steps 1 and 2 in Section 4-3.
2. Install the Drum Assembly on the flatness check tool.
3. Remove the two brush base fixing screws and remove the Brush Assembly from the Drum Assembly.
4. Disconnect the twelve lead wires soldered onto the SBX Board.
5. Remove the Slip Ring Assembly from the removed Upper Drum Assembly as described in Section 4-5.
6. Remove the two hexagonal headed screws from the Upper Drum Assembly with the L-shaped hexagonal wrench, then remove the Upper Drum Assembly from the Drum Assembly.
7. Pass the eight lead wires from the flange through the upper drum assembly and place the new upper drum assembly on the flange. The red lead wire should face the direction shown in the figure.
8. Thread the hexagonal headed screws on the new Upper Drum Assembly to the flange snugly but do not tighten.

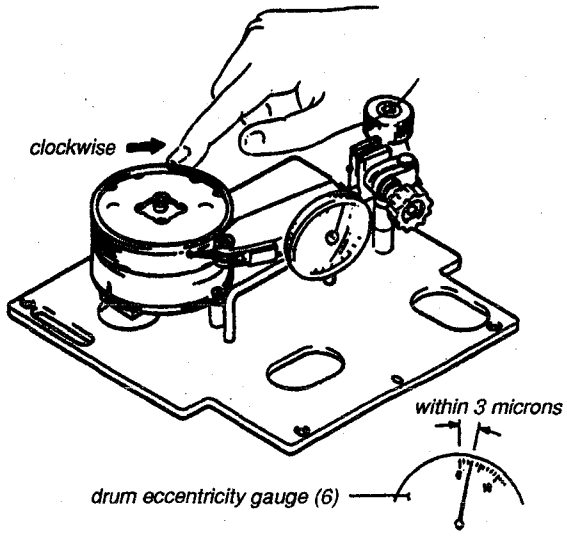


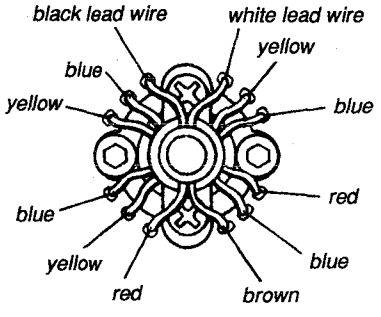




9. Assemble the drum eccentricity gauges 3, 2, 6, and install them on the flatness check tool.
10. Adjust the position of gauge so that the tip probe is positioned at the point about 2mm from the top edge of the Upper Drum.
11. Turn the Upper Drum Assembly slowly clockwise and confirm that the pointer deflection of the gauge is within 3 microns during one complete turn.
    If the specification is satisfied, perform Step 13 and later. If not, perform Step 12 and later.
12. To satisfy the specification, adjust the position of the upper drum assembly by moving it manually.
13. After adjustment, alternately tighten the two hexagonal headed screws.
14. Confirm that the specification is satisfied once again.
15. Solder the eight lead wires from the flange to the SBX board.
16. Install the Slip Ring Assembly removed in Step 5 as described in Section 4-5.
17. Install the Brush Assembly.
18. Perform the Brush Position Adjustment in Section 6-16-1.
19. Remove the Drum Assembly from the flatness check tool.
20. Perform steps 3 through 6 in Section 4-3.



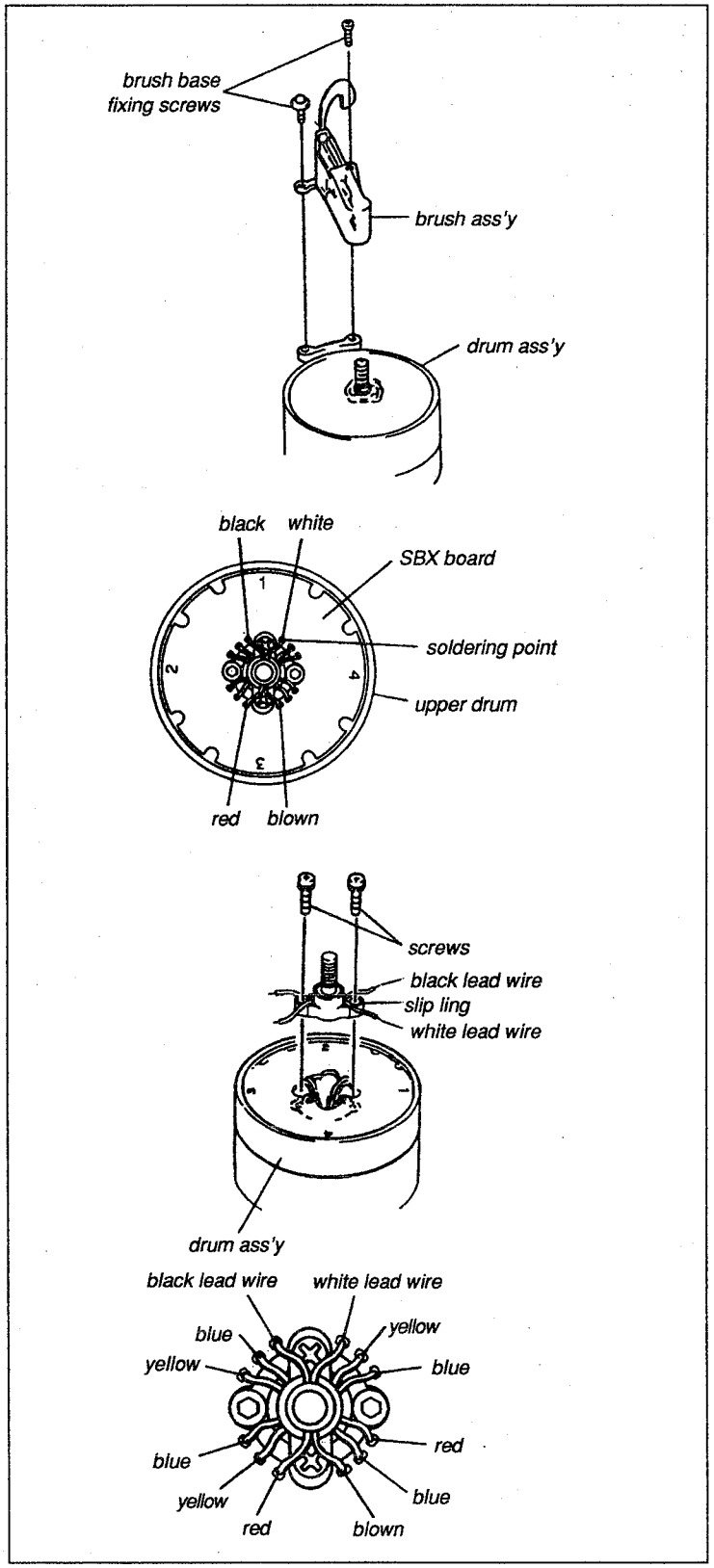




4-5. REPLACEMENT OF THE SLIP RING ASSEMBLY

Tool: Tweezers
Mode: EJECT
Replacement procedure:

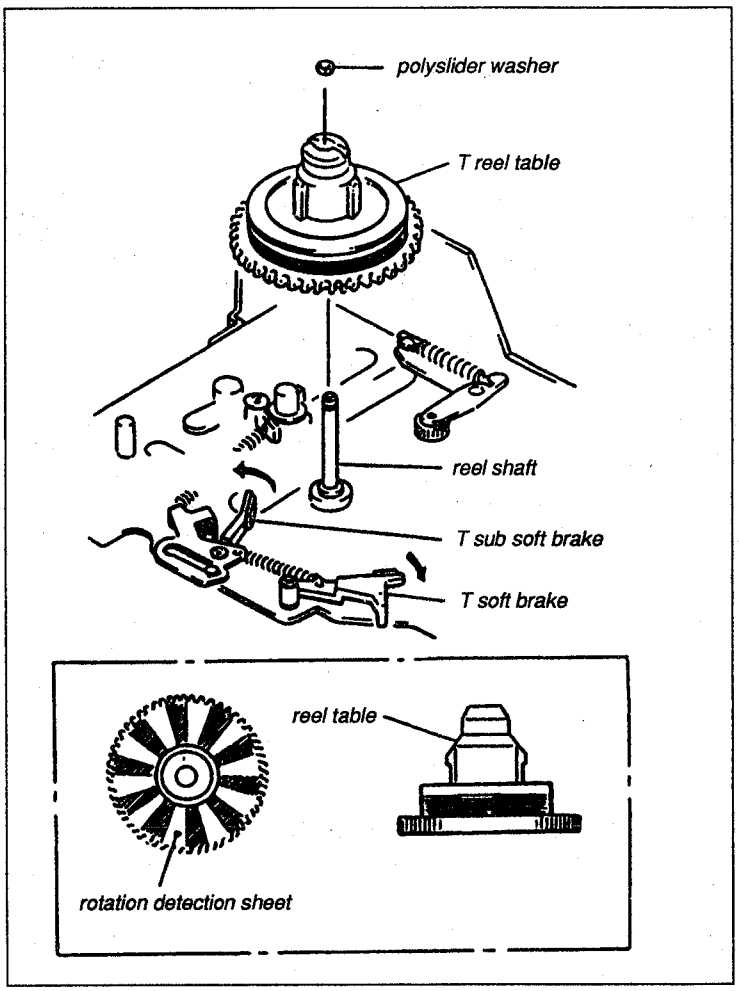
1. Disconnect the flexible board (FL-54 Board) of the Slip Ring which is connected to CN28 on the MB-552 Board with a pair of tweezers. (Refer to Section 2-13.)
2. Remove the two brush base fixing screws and remove the Brush Assembly from the unit.
3. Desolder the four lead wires of the Slip Ring from the SBX Board of the Upper Drum Assembly.
4. Remove the two screws of the Slip Ring, then remove the Slip Ring from the unit.
5. Arrange the black and white lead wires of the new Slip Ring so that they are facing the side of the SBX Board with the silk screen printed "1", and put on the Drum Assembly.
6. Install the Slip Ring onto the Drum Assembly with the two screws.
7. Solder the four lead wires on the SBX Board as shown in the figure.
8. Install the Brush Assembly.
9. Perform the Brush Position Adjustment in Section 6-16-1.
10. Install and lock the flexible board (FL-54 Board) of the Slip Ring into CN28 on the MB-552 Board with tweezers. (Refer to Section 2-13.)



4-6. REPLACEMENT OF THE TAKE-UP SIDE REEL TABLE

Mode: EJECT
Replacement:

1. Remove the Brake Slider referring to Section 4-14.
2. Remove the polyslider washer at the top of the T Reel Table.
3. Release the pressures of the T Sub Soft Brake and T Soft Brake from the T Reel Table while pressing them in the direction of the arrows, and remove the T Reel Table from the unit.
4. Clean the reel shaft with a cleaning piece moistened with cleaning fluid.
5. Clean the Rotation Detection Sheet surface of the new T Reel Table and the reel table's outer circumference with a cleaning piece moistened with cleaning fluid.
6. Release the T Sub Soft Brake and T Soft Brake as in Step 3, insert the T Reel Table onto the Reel Shaft, and fasten it with the 1.2mm diameter polyslider washer.
7. While releasing the T Sub Soft Brake, rotate the T Reel Table by hand to check that it rotates smoothly.
8. Install the Brake Slider referring to Section 4-14.
9. After replacement, while releasing the T Soft Brake and T Sub Soft Brake, rotate the T Reel Table, and check that it rotates smoothly.

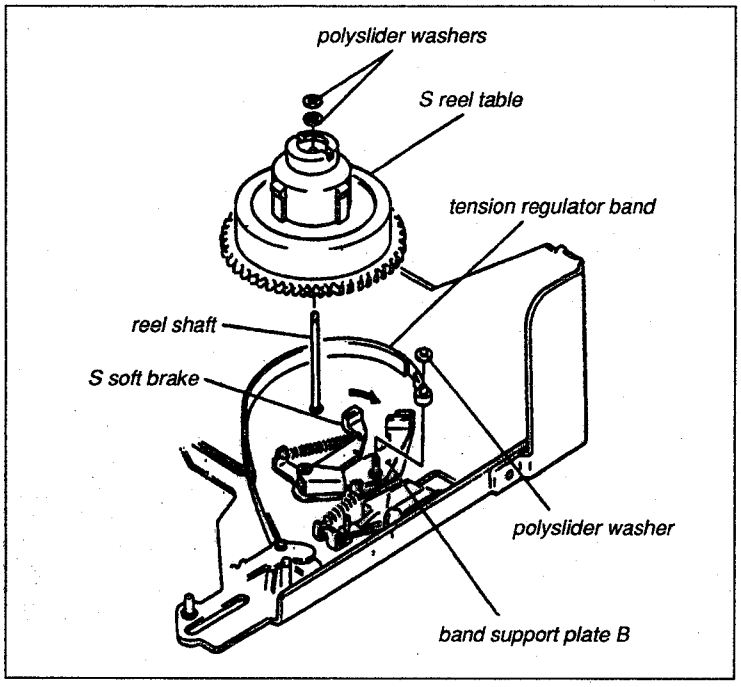


4-7. REPLACEMENT OF THE SUPPLY SIDE REEL TABLE

Mode: EJECT

Replacement procedure:

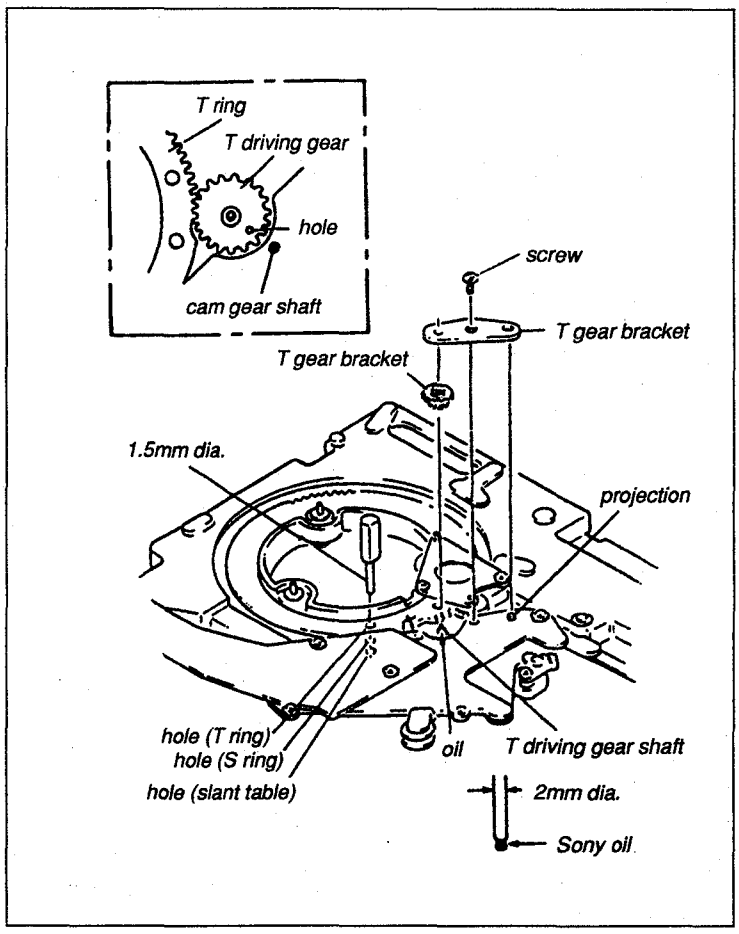
1. Remove the polyslider washer (shown in the figure) fixing the Tension Regulator Band.
2. Remove the polyslider washer at the top of the S Reel Table.
3. Release the pressure of the S Soft Brake from the S Reel Table while pressing it in the direction of the arrow, and remove the S Reel Table from the unit.
4. Clean the reel shaft with a cleaning piece moistened with cleaning fluid.
5. Clean the Rotation Detection Sheet surface of the a new S Reel Table and the reel table's outer circumference with a cleaning piece moistened with cleaning fluid.
6. Release the S Soft Brake as in Step 3, insert the S Reel Table onto the reel shaft, and fasten it with the 2mm diameter polyslider washer and the 1.2mm diameter polyslider washer.
7. Insert the Tension Regulator Band onto the shaft of the Band Support B Assembly and fasten it with the 1.2mm diameter polyslider washer.
8. After replacement, while releasing the S Soft Brake, rotate the S Reel Table by hand to check that it rotates smoothly.
9. After replacement, perform the adjustments in Section 4-39.



4-8. REPLACEMENT OF THE TAKE-UP SIDE DRIVING GEAR

Tool: 1.5mm diameter rod
Mode: EJECT
Replacement procedure:

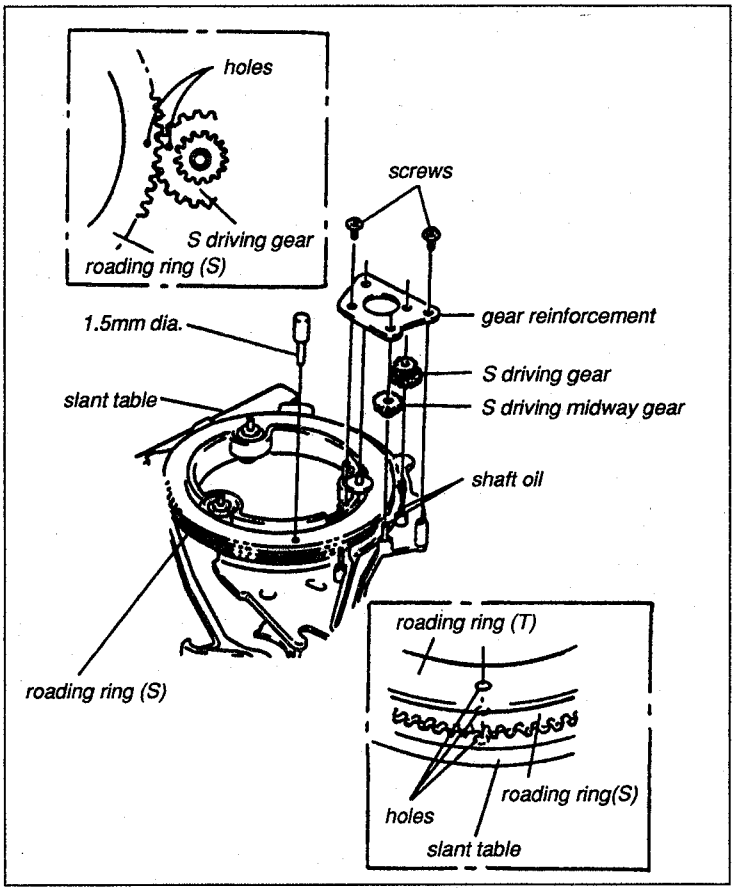
1. Remove the SS-57 Board. (Refer to Section 2-11-7.)
2. Remove the shield plate. (Refer to Section 4-36.)
3. Remove a fixing screw of the T Gear Bracket and remove the T Gear Bracket and T Driving Gear from the back of the Mechanical Deck Block.
4. Clean the T Driving Gear Shaft with a cleaning piece moistened with cleaning fluid.
5. Apply a half drop of Sony oil on the above shaft. (One drop of Sony oil is about amount that remains on the tip of 2mm diameter rod dipped in oil.)
6. Align the three holes (1.5mm dia.) of the Threading Ring (take-up side), Threading Ring (supply side), and Slant Table, then pass a rod (1.5mm dia.) through the holes.
7. Insert the T Driving Gear onto the shaft so that the positional relationship between the T Driving Gear hole and Cam Gear Shaft are aligned as shown in the detail figure.
8. Install the T Gear Bracket with a fixing screw.
9. Repeat threading and unthreading two or three times and check that they can be done smoothly.



4-9. REPLACEMENT OF THE SUPPLY SIDE DRIVING GEAR

Tool: 1.5mm diameter rod
Mode: EJECT
Replacement procedure:

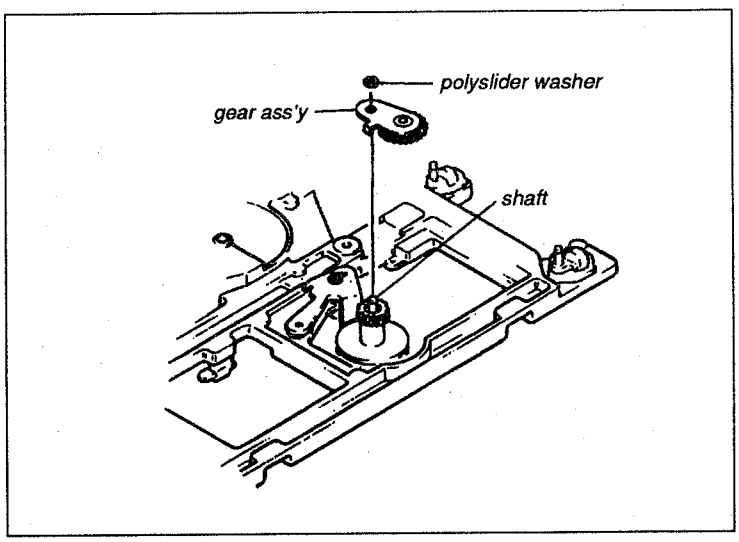
1. Remove the SS-57 Board. (Refer to Section 2-11-7.)
2. Remove the shield plate. (Refer to Section 4-36.)
3. Remove the two fixing screws of the Gear Reinforcement, and then remove the Gear Reinforcement, S Driving Midway Gear, and S Driving Gear from the back of the Mechanical Deck Block.
4. Clean the S Driving Midway Gear and S Driving Gear Shafts with a cleaning piece moistened with cleaning fluid.
5. Apply a half drop of Sony oil on the above two shafts.
6. Align the three holes (1.5mm dia.) of the Threading Ring (take-up side), Threading Ring (supply side), and Slant Table, then pass one rod (1.5mm dia.) through the holes.
7. Insert the S Driving Gear onto the shaft so that the positional relationship between the S Driving Gear hole and Threading Ring (supply side) hole are aligned as shown in the detail figure.
8. Insert the S Driving Midway Gear and install the Gear Reinforcement with two fixing screws.
9. Repeat threading and unthreading two or three times and check that they can be done smoothly.



4-10. REPLACEMENT OF THE GEAR ASSEMBLY

Mode: EJECT
Replacement procedure:

1. Remove the polyslider washer at the top of the Gear Assembly.
2. Clean the shaft of the Gear Assembly with a cleaning piece moistened with cleaning fluid.
3. Insert the new Gear Assembly onto the shaft, push a polyslider washer onto the shaft, and fasten the Gear Assembly.
4. Perform the PLAY, FF, and REW operations two or three times and check that they can be done smoothly.
5. After replacement, perform the Gear Assembly Position Adjustment in Section 5-1.

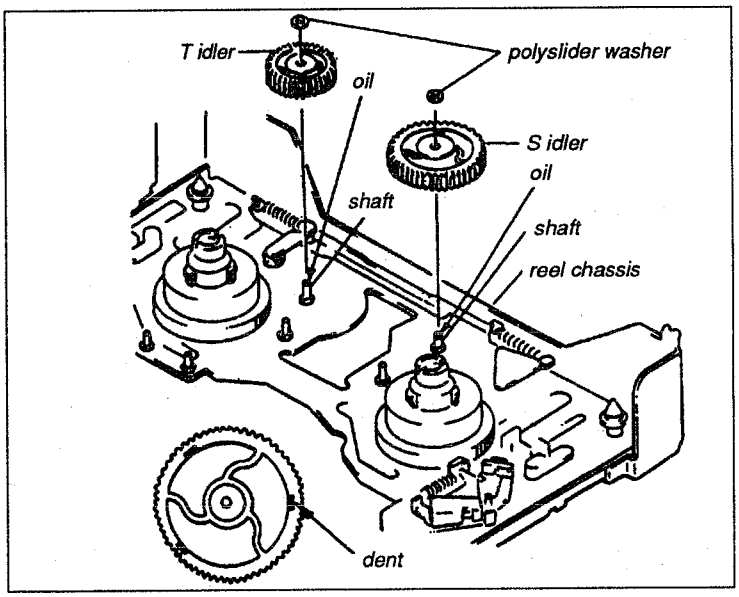


4-11. REPLACEMENT OF THE SUPPLY/TAKE-UP SIDE IDLER

- Since the S and T Idlers are replaced in the same manner, only replacement of the S Idler is described below.

Mode: EJECT
Replacement procedure:

1. Remove the polyslider washer and remove the S Side Idler from the unit.
2. Clean the Reel Shaft with a cleaning piece moistened with cleaning fluid.
3. Apply an 1/4 drop of Sony oil on the shaft.
4. As shown in the figure, install the S Idler in the unit with the S Idler surface's three dents faced to the reel chassis.
5. Fasten the S Idler with the 1.2mm diameter polyslider washer.

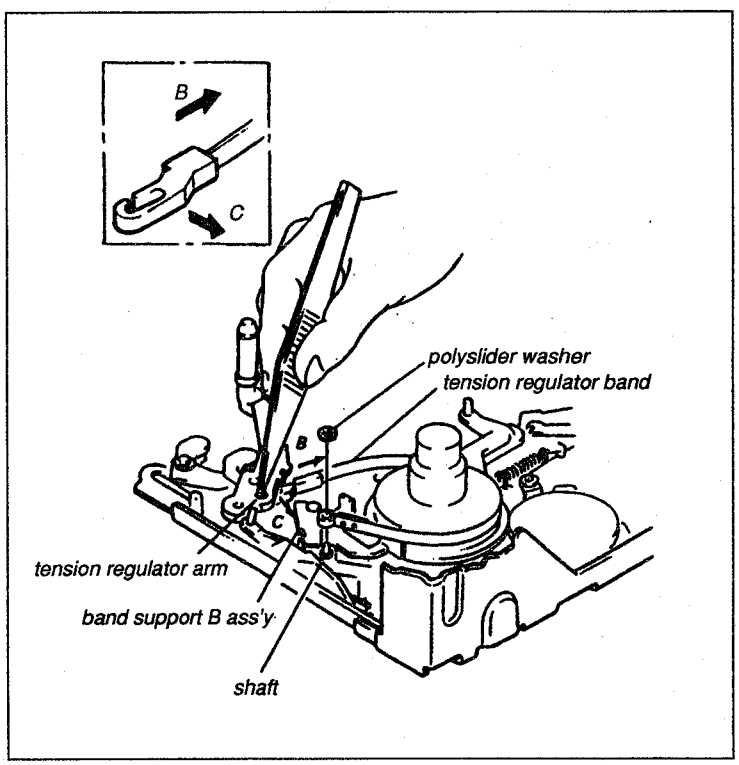


4-12. REPLACEMENT OF THE TENSION REGULATOR BAND

- When replacing the Tension Regulator Band, be careful not to touch or bend the band felt portion.

Tool: Tweezers
Mode: Theading end
Replacement procedure:

1. Put the unit into the threading end mode. (Refer to Section 4-1.)
2. Remove the polyslider washer shown in the figure.
3. Push the Arm Hook of the Tension Regulator Band in the opposite direction of the arrow B.
4. Insert twezzers into the hole of the Tension Regulator Arm shown in the figure, and hold the hook and push it in the direction of the arrow C, then remove the Tension Regulator Band.
5. Insert the hook of a new Tension Regulator Band into the lower portion of the Tension Arm in the direction indicated by the figure and push the hook in the opposite direction of the arrow C to lock it to the pin.
6. Pull the hook of the Tension Regulator band in the direction of the arrow B.
7. Taking care not to bend the Tension Regulator Band, wind it around the S Reel.
8. Insert another hook of the Tension Regulator Band onto the shaft of the Band Support B Assembly and fasten it with 1.2mm diameter polyslider washer onto the shaft.
9. After replacement, perform the adjustments in Section 4-39.



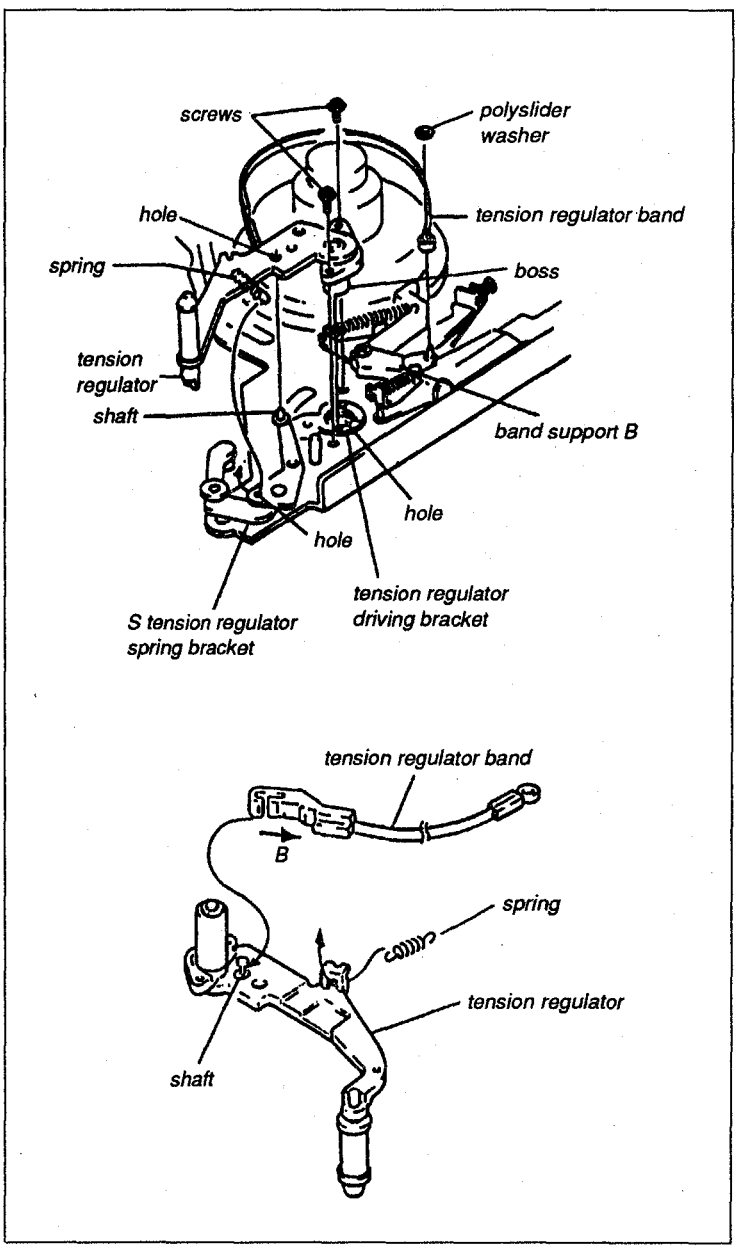
4-13. REPLACEMENT OF THE TENSION REGULATOR

- When replacing the Tension Regulator, remove the Tension Regulator Band from the unit. Be careful not to touch or bend the band felt portion.

Mode: EJECT

Replacement procedure:

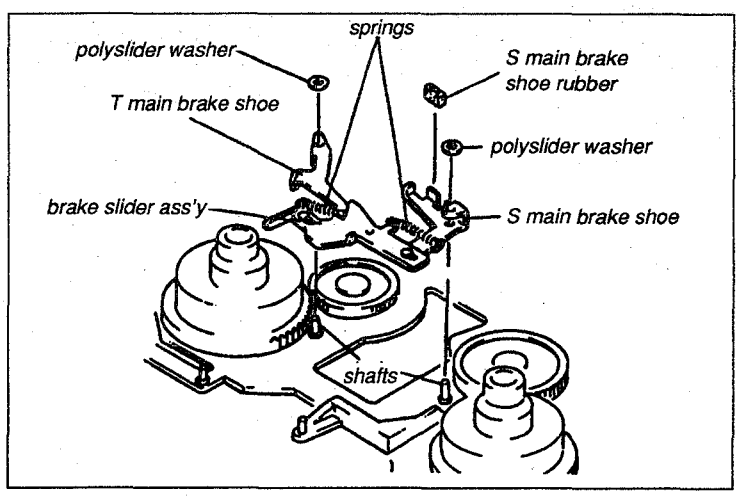
1. Remove the polyslider washer fixing the Tension Regulator Band.
2. Remove the spring shown in the figure from the S Tension Regulator Spring Bracket.
3. Remove the two fixing screws of the Tension Regulator and remove the Tension Regulator from the unit.
4. Remove the spring (removed in Step 2) from the removed Tension Regulator and install it on the new Tension Regulator in the direction as shown in the figure.
5. Remove the Tension Regulator Band from the removed Tension Regulator and install it on the new Tension Regulator in the direction shown in the figure. After installation, pull the band in the direction of the arrow B.
6. Align the hole of the Tension Regulator Driving Bracket with the reel chassis hole.
7. Insert the Tension Regulator Boss into the reel chassis hole. Adjust the Tension Regulator position so that the Driving Bracket Shaft is inserted into the illustrated hole of the Tension Regulator.
8. Install the Tension Regulator with the two screws.
9. Install the spring (removed in Step 2) on the S Tension Regulator Spring bracket in the direction as shown in the figure.
10. Being careful not to bend the Tension Regulator Band, wind it around the S Reel.
11. Insert the other hook of the band onto the shaft of the Band Support B Assembly and insert the 1.2mm diameter polyslider washer onto the shaft.
12. After replacement, perform the adjustments in Section 4-39.



4-14. REPLACEMENT OF THE MAIN BRAKE SHOE

Mode: EJECT
Replacement procedure:

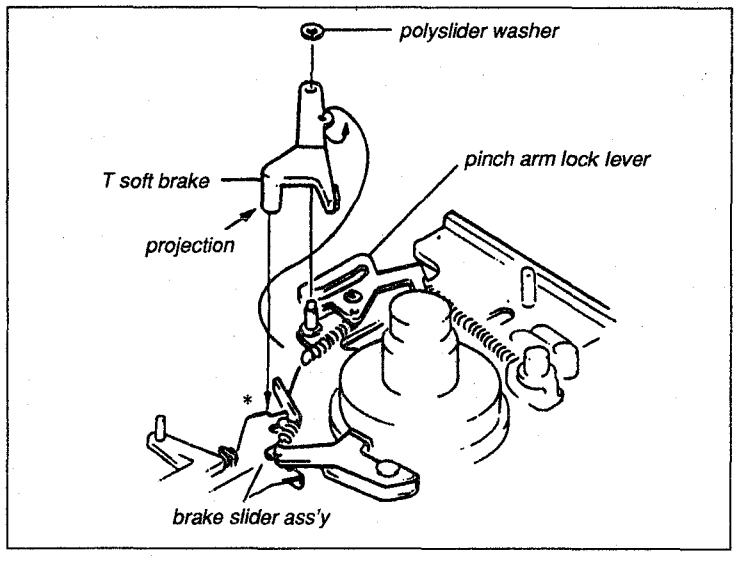
1. Remove the T or S Brake Shoe Rubber.
2. Install the new Brake Shoe Rubber.



4-15. REPLACEMENT OF THE TAKE-UP SIDE SOFT BRAKE

Mode: EJECT
Replacement procedure:

1. Remove the spring from the Pinch Arm Lock Lever which is hooked to the T Soft Brake.
2. Remove the polyslider washer and remove the T Soft Brake from the unit.
3. Install the T Soft Brake to the unit so that the projection of the new T Soft Brake is positioned to the * marked portion of the Brade Slider Assembly, insert the 1.2mm diameter polyslider washer onto the shaft, and fasten the T Soft Brake.
4. Hook the spring of the Pinch Arm Lock Lever to the T Soft Brake.

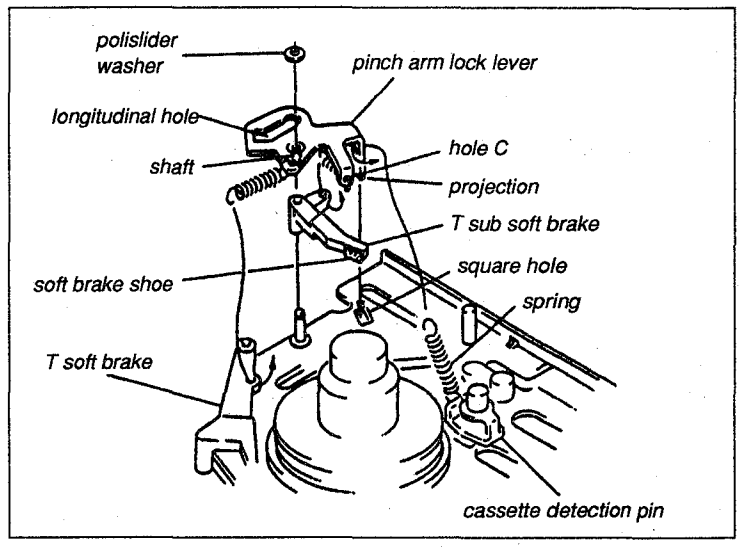


4-16. REPLACEMENT OF THE TAKE-UP SIDE SUB SOFT BRAKE

Mode: EJECT

Replacement procedure:

1. Remove the spring from the Pinch Arm Lock Lever which is hooked to the T Soft Brake.
2. Remove the spring from the Cassette Detection Pin which is hooked to the Pinch Arm Lock Lever.
3. Remove the polyslider washer fixing the Pinch Arm Lock Lever and remove the Lock Lever from the unit.
4. Remove the spring from the T Sub Soft Brake which is hooked on hole C of the Pinch Arm Lock Lever.
5. Remove the spring from the T Sub Soft Brake and hook it on the new T Sub Soft Brake in the direction as shown in the figure.
6. Insert the T Sub Soft Brake onto the shaft of the Pinch Arm Lock Lever and hook the spring as shown in the figure.
7. Install the Pinch Arm Lock Lever on the unit so that the projection of the Pinch Arm Lock Lever is inserted into the Square hole of the reel chassis, the T Sub Soft Brake Shoe touches the reel table, and the Pinch Arm Roller is inserted into the longitudinal hole of the Lock Lever.
8. Insert the 1.2mm diameter polyslider washer onto the shaft and fasten the Lock Lever.
9. Hook the spring which is removed in Steps 1 and 2 .

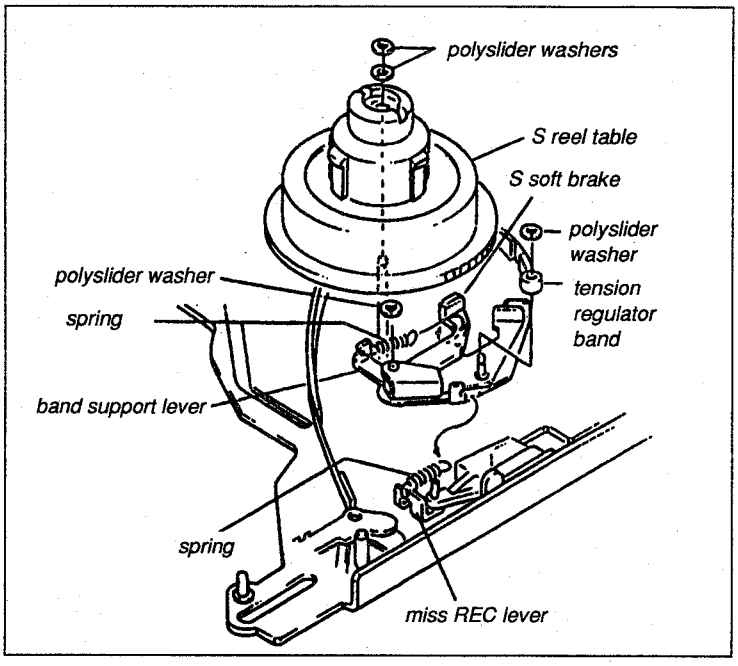


4-17. REPLACEMENT OF THE SUPPLY SIDE SOFT BRAKE

Mode: EJECT

Replacement procedure:

1. Remove the polyslider washer (shown in the figure) fixing the Tension Regulator Band.
2. Remove the polyslider washer at the top of the S Reel Table.
3. Remove the S Reel Table from the unit while releasing the pressure against the S Reel Table of the S Soft Brake.
4. Remove the spring from the Miss REC Lever B hooked on the Band Support Lever.
5. Remove the polyslider washer shown in the figure and remove the Band Support Lever from the unit.
6. Remove the spring from the S Soft Brake.
7. Install the new S Soft Brake and hook the spring removed in Step 4 in the direction as shown in the figure.
8. Assemble the S Soft Brake by reversing the Steps 1 through 5.



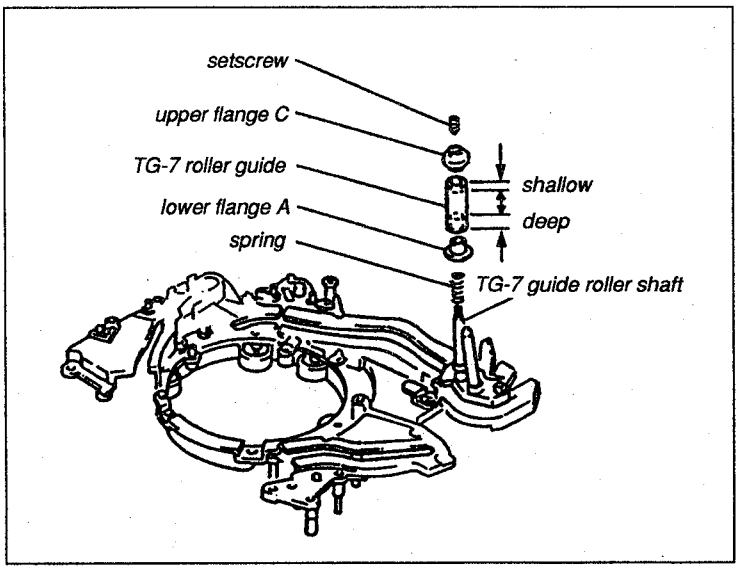
4-18. REPLACEMENT OF THE COMPONENT PARTS OF TAKE-UP SIDE BASE

- Replacement of the TG-7 (guide roller) on the T Base differs from replacement of the other components.
- Refer to Section 4-18-1 for replacement the TG-7, and refer to Section 4-18-2 for other components.

4-18-1. Replacement of the TG-7

Tool: Tape guide adjustment screwdriver
Mode: EJECT
Replacement procedure:

1. Loosen the setscrew at the top of the TG-7 with the tape guide adjustment screwdriver.
2. Remove the Upper Flange C.
3. Remove the TG-7 Roller Guide TG-7, the Lower flange A, and the compression spring.
4. Clean the TG-7 Guide Roller Shaft with a cleaning piece moistened with cleaning fluid.
5. Insert the compression spring removed in Step 3 onto the TG-7 Guide Roller Shaft.
6. Carefully insert the Lower Flange A and TG-7 Guide Roller onto the TG-7 Guide Roller Shaft in the direction as shown in the figure.
7. Install the Upper Flange C.
8. Tighten the setscrew at the top of the guide with the tape guide adjustment screwdriver.
9. After replacement, perform the adjustments in Section 4-39.



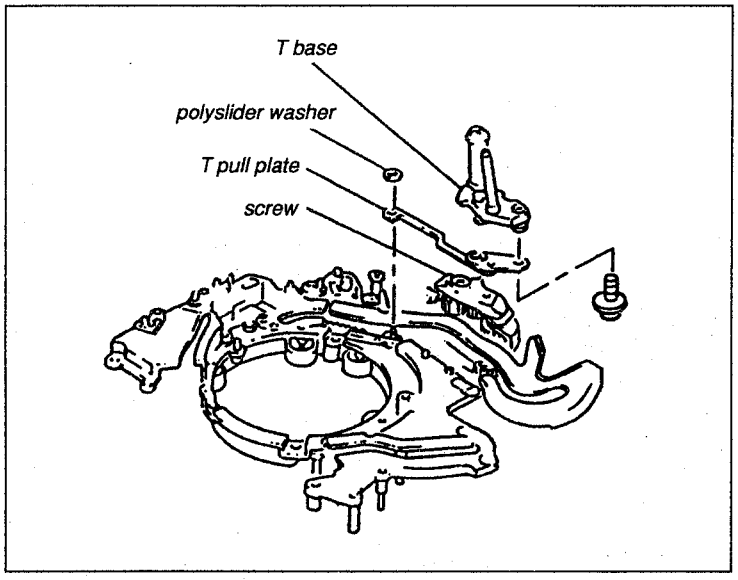
4-18-2. Replacement of the Component Parts of the Take-up Side Base

- For replacement of the TG-7 on the T Side Base, refer to Section 4-18-1.
- When replacing the components other than TG-7 on the T Side Base, remove the Drum from the unit once so as not to damage it.

Mode: Turn the screw shown in the figure so that the Take-up Side Base reaches the end of the Take-up Side Rail (I).

Replacement procedure:

1. Remove the Drum Assembly from the unit. (Refer to Section 4-3.)
2. Turn the screw and set the Take-up Side Base in the position described above.
3. Remove the Take-up Side Rail (I). (Refer to Section 4-31.)
4. Remove the polyslider washer fixing the Take-up Side Pull Plate and remove the Take-up Side Base from the unit.
5. Replace the faulty component which constitutes the Take-up Side Base.
6. Assemble the Take-up Side Base by reversing the Steps 1 through 4 .
7. After replacement, perform the adjustments in Section 4-39.



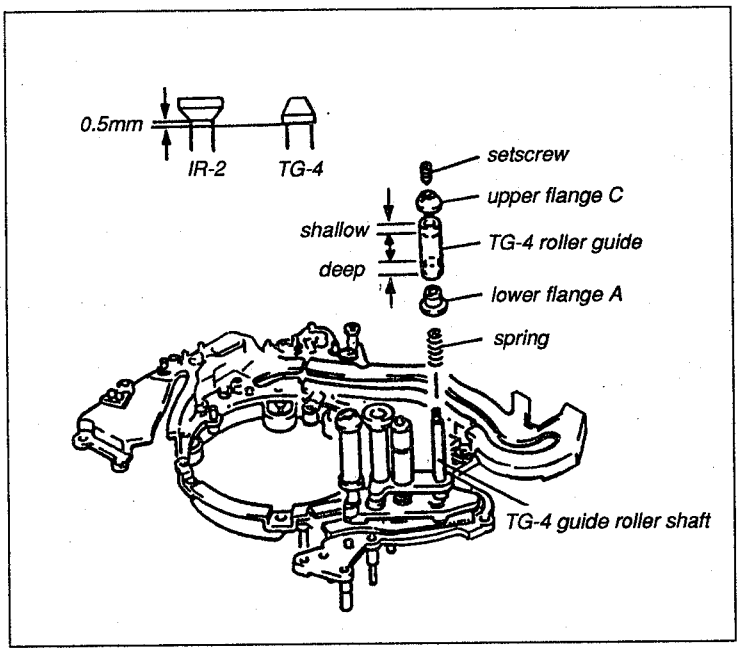
4-19. REPLACEMENT OF THE COMPONENT PARTS OF THE SUPPLY SIDE BASE

- Replacement of the S Sub Base, TG-4, TG-5, and IR-2 (impedance roller guide) on the S Base differs from replacement of the other components.
- Refer to Section 4-19-1 for TG-4, Section 4-19-2 for TG-5, Section 4-19-3 for IR-2, Section 4-19-4 for S Sub Base, and Section 4-19-5 for replacing the other components.

4-19-1. Replacement of the TG-4

Tool: Tape guide adjustment screwdriver
Mode: EJECT
Replacement procedure:

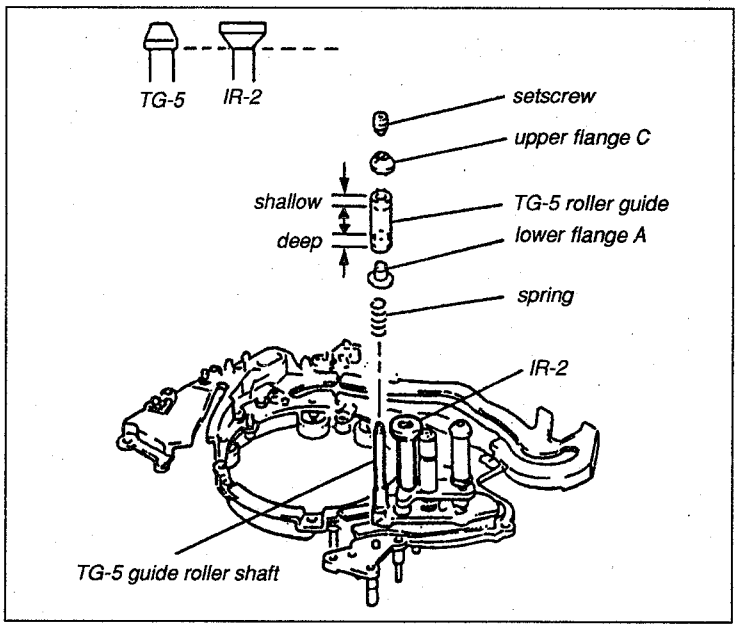
1. Loosen the setscrew at the top of the TG-4 with the tape guide adjustment screwdriver.
2. Remove the Upper Flange C.
3. Remove the TG-4 Roller Guide, Lower Flange A, and the compression spring.
4. Clean the TG-4 Guide Roller Shaft with the cleaning piece moistened with cleaning fluid.
5. Insert the compression spring removed in Step 3 onto the TG-4 Guide Roller Shaft.
6. Carefully insert the Lower Flange A and TG-4 Roller Guide onto the TG-4 Guide Roller Shaft in the direction as shown in the figure.
7. Install the Upper Flange C, and adjust the position of the TG-4 Roller Guide so that the lower end of the Upper Flange of the TG-4 Guide Roller is about 0.5mm lower than the lower end of the IR-2 Guide Upper Flange.
8. Tighten the setscrew at the top of the guide using a tape guide adjustment screwdriver.
9. After replacement, perform the adjustments in Section 4-39.



4-19-2. Replacement of the TG-5

Tool: Tape guide adjustment screwdriver
Mode: EJECT
Replacement procedure:

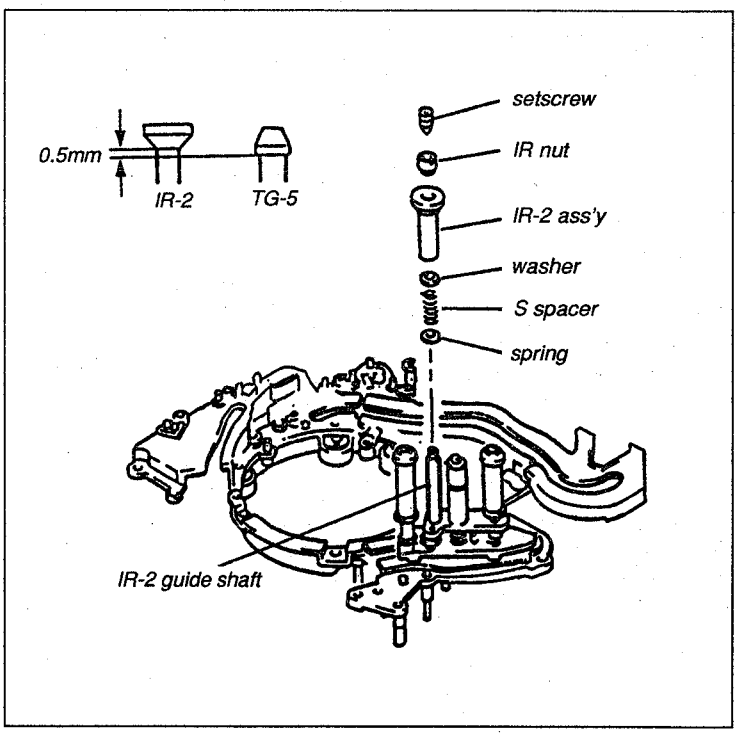
1. Loosen the setscrew at the top of TG-5 with the tape guide adjustment screwdriver.
2. Remove the Upper Flange C.
3. Remove the TG-5 Roller Guide, Lower Flange A, and the compression spring.
4. Clean the TG-5 Guide Roller Shaft with a cleaning piece moistened with cleaning fluid.
5. Insert the compression spring removed in Step 3 onto the TG-5 Guide Roller Shaft.
6. Carefully insert Lower Flange A and the TG-5 Roller Guide onto the TG-5 Guide Roller Shaft in the direction as shown in the figure.
7. Install the Upper Flange C, and adjust the position of the TG-5 Guide Roller so that the lower end of the Upper Flange is the same in height as the lower end of the IR-2 Guide Upper Flange as viewed.
8. Tighten the setscrew at the top of the guide with the tape guide adjustment screwdriver.
9. After replacement, perform the adjustments in Section 4-39.



4-19-3. Replacement of the IR-2 Guide (Impedance Roller Guide)

Tool: Tape guide adjustment screwdriver
Mode: EJECT
Replacement procedure:

1. Loosen the setscrew at the top of the IR-2 Guide with the tape guide adjustment screwdriver.
2. Remove the IR Nut.
3. Remove the IR-2 Assembly, washer (1.4mm dia.), compression spring, and S Spacer from the IR-2 Guide Shaft.
4. Clean the IR-2 Guide Shaft with a cleaning piece moistened with cleaning fluid.
5. Install the S Spacer, compression spring, and washer (1.4mm dia.) removed in Step 3 onto the IR-2 Guide Shaft.
6. Carefully insert the new IR-2 Assembly onto the IR-2 Guide Shaft.
7. Install the IR Nut, and adjust the position of the IR-2 Guide so that the lower end of the IR-2 Guide Upper Flange is about 0.5mm higher than the lower end of the TG-5 Guide Upper Flange.
8. Tighten the setscrew at the top of the guide with the tape guide adjustment screwdriver.
9. After replacement, perform the adjustments in Section 4-39.

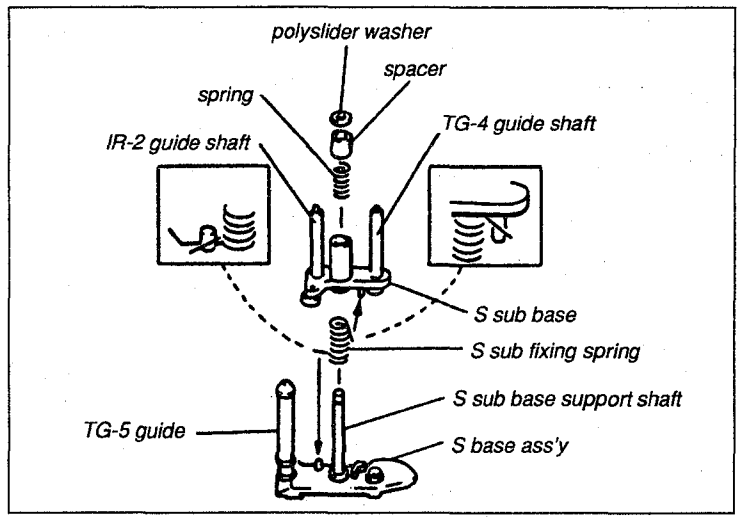


4-19-4. Replacement of the Supply Side Sub Base

- The TG-4 and IR-2 Guides are provided on the S Sub Base. When replacing the S Sub Base, replace the TG-4 and IR-2 Guides referring to Sections 4-19-1 and 4-19-3. Then, adjust the height with the TG-5 Guide as reference.

Tool: Tape guide adjustment screwdriver
Mode: EJECT
Replacement procedure:

1. Remove the polyslider washer at the top of the S Sub Base.
2. Remove the spacer, compression spring, S Sub Base on which TG-4 and IR-2 Guide are installed, and S Sub Fixing Spring.
3. Clean the new S Sub Base TG-4 Guide Shaft and IR-2 Guide Shaft with a cleaning piece moistened with cleaning fluid.
4. Remove the TG-4 Guide Roller and IR-2 Impedance Roller from the S Sub Base removed in Step 2 and install them on the new S Sub Base.
5. Clean the S Sub Base Support Shaft with a cleaning piece moistened with cleaning fluid.
6. Insert the S Sub Fixing Spring, S Sub Base (assembled in Step 4), compression spring, and spacer onto the S Sub Base Support Shaft.
7. Hook the S Sub Fixing Spring as shown in the figure.
8. Insert the polyslider washer (1.5mm dia.) onto the top of the S Sub Base Shaft and fasten the S Sub Base.
9. Adjust the height of the TG-4 and IR-2 Guides with the TG-5 Guide as reference. (Refer to Sections 4-19-1 and 4-19-3).
10. After replacement, perform the adjustments in Section 4-39.



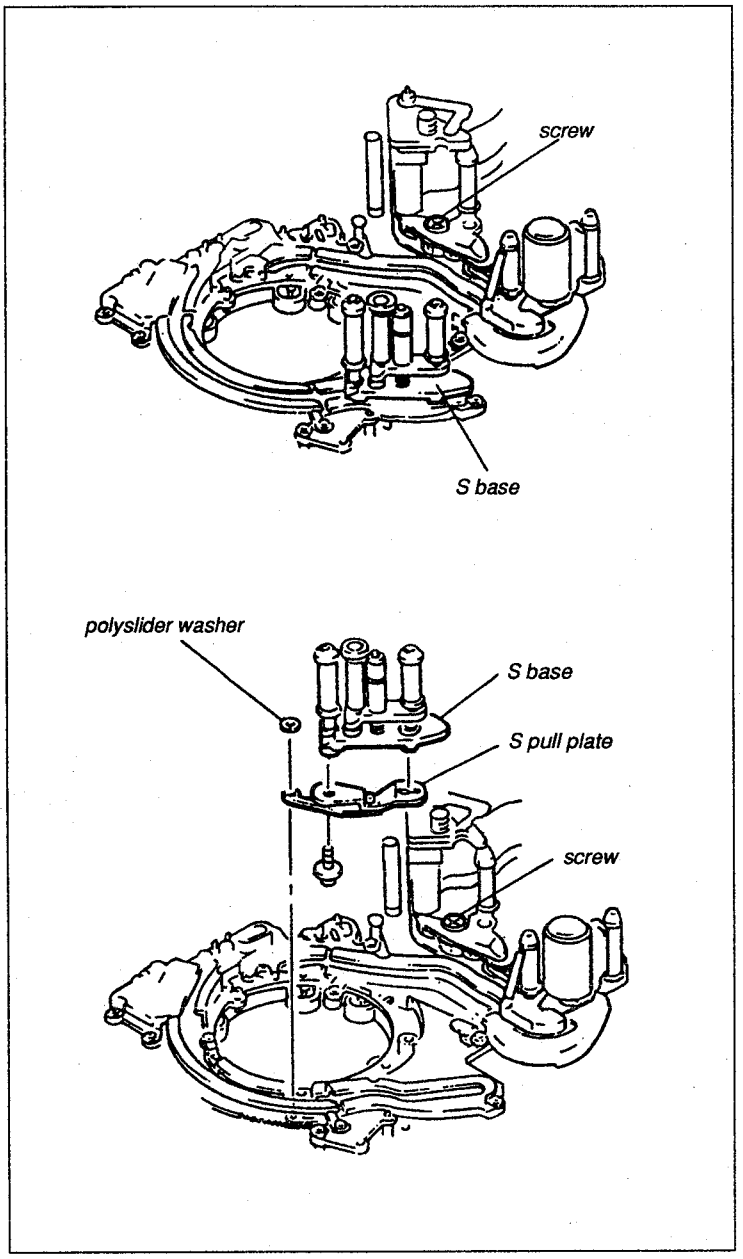
4-19-5. Replacement of the Component Parts of the Supply Side Base

- Refer to the appropriate section for replacing the TG-4, TG-5, and IR-2 Guides on the S Base.
- When replacing the components other than the above components on the S Base, remove the Drum Assembly from the unit so as not to damage it.

Mode: Turn the screw shown in the figure so that the S Side base reaches the end of the S Side rail.

Replacement procedure:

1. Remove the Drum Assembly from the unit. (Refer to Section 4-3).
2. Turn the screw and set the S Side Base in the position described above.
3. Remove the S Side Rail (I). (Refer to Section 4-29).
4. Remove the polyslider washer fixing the Supply Side Pull Plate and remove the S Side Base from the unit.
5. Replace the faulty component which constitutes the S Side base.
6. Assemble the S Side Base by reversing the Steps 1 through 4 .
7. After replacement, perform the adjustments in Section 4-39.



4-20. REPLACEMENT OF THE CTL HEAD BLOCK

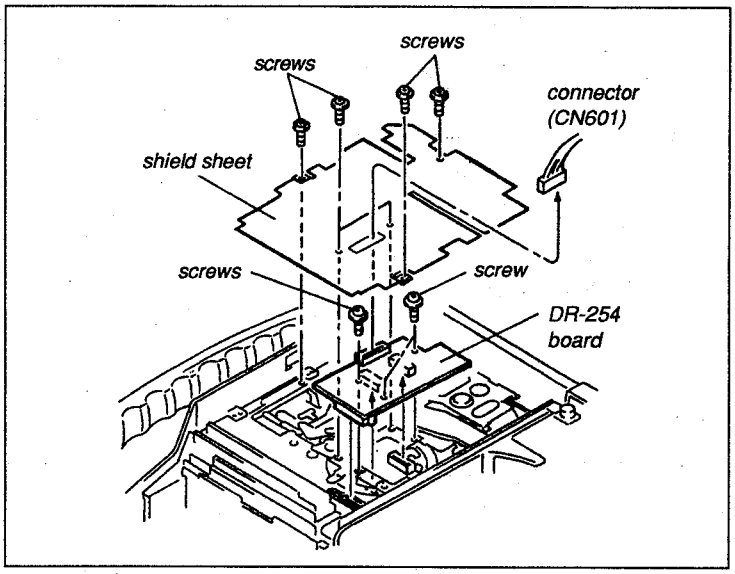
- The CTL Head Block consists of the CTL Head, Erase Head, FE-18 Board, IR-1 Guide (impedance roller guide), and tape guide. Replacement of the above components is described below.
- When replacing the CTL Head, Erase Head, and FE-18 Board, remove the CTL Head Block from the unit. The removal and installation are described below.

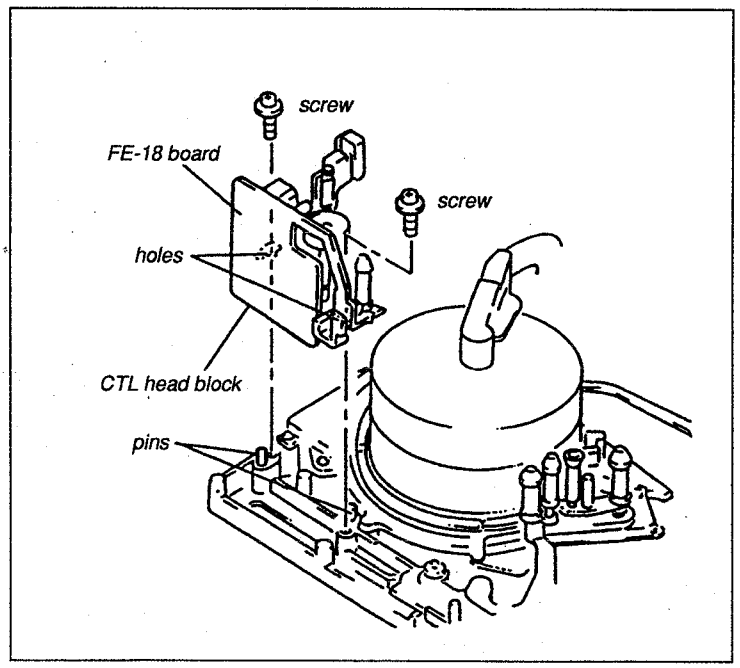
Mode: EJECT

Removal and installation:

- Remove the shield plate and the DR-254 board from the unit as shown in the figure.
- Remove the two fixing screws of the CTL Head Block and remove the CTL Head Block from the unit.
- Install the CTL Head Block on the chassis with the two screws so that the two pins of the chassis are inserted into the CTL Head Block holes.

  (Note) • The connector of the FE-18 Board should be inserted in the connector of the DR-254 Board properly.
  - If the connector is not inserted properly, the "HUMID" indicator will appear on the display window, the condensation sensor will work, and the unit will stop its operation.
  - Install the shield plate and the DR-254 board.



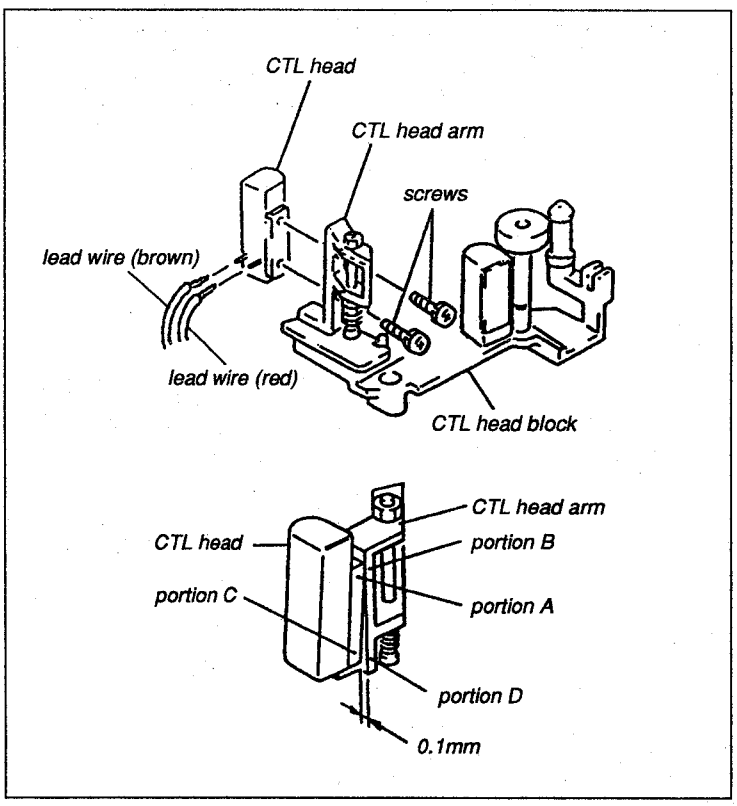


4-20-1. Replacement of the CTL Head

Mode: EJECT

Replacement procedure:

1. Remove the shield plate and the DR-254 board from the unit. (Refer to Section 4-20.)
2. Remove the CTL Head Block from the unit.
3. Unsolder the two lead wires which are mounted onto the CTL Head.
4. Remove the two screws of the CTL Head Arm and remove the CTL Head.
5. Install the new CTL Head to the CTL Head Arm with two screws snugly but do not tighten.
6. Adjust the CTL Head position so that the surface of the CTL Head Bracket's upper end (portion A in the figure) is the same plane as that of the CTL Head Arm's upper end (portion B), and the CTL Head Bracket's lower end (portion C) is shifted by 0.1 mm with respect to CTL Head Arm's lower end (portion D) as shown in the figure. Then, tighten the two fixing screws.
   (Tightening torque: 0.3±0.05N•m{3±0.5kg•cm})
7. Solder the two lead wires removed in Step 2 .
8. Install the CTL Head Block on the unit.
   (Note) • The connector of the FE-18 Board should be inserted in the connector of the DR-254 Board properly.
   • If the connector is not inserted properly, "HUMID" indicator will appear on the display window, the condensation sensor will work, and the unit will stop its operation.
9. Install the shield plate and the DR-254 board.
10. After replacement, perform the adjustments in Section 4-39.

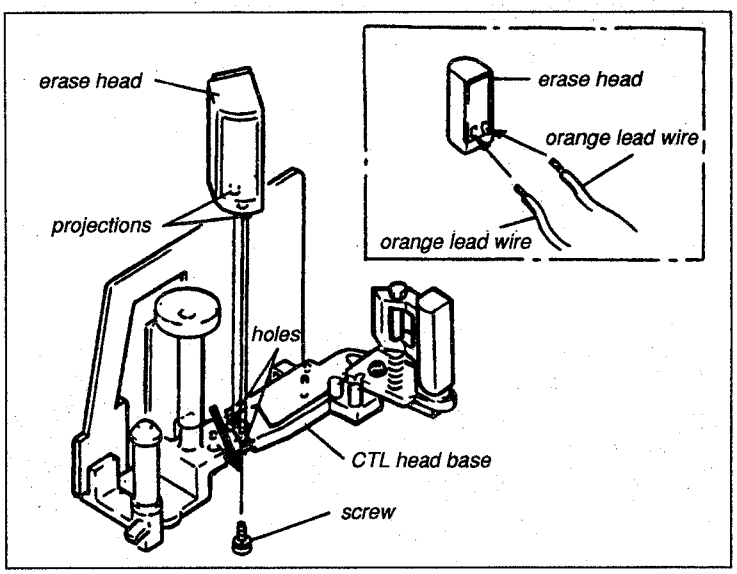


4-20-2. Replacement of the Erase Head

Mode: EJECT

Replacement procedure:

1. Remove the shield plate and the DR-254 board from the unit. (Refer to 4-20).
2. Remove the CTL Head Block from the unit.
3. Remove a screw from the lower side of the CTL Head Block and remove the Erase Head.
4. Unsolder the two lead wires of the Erase Head.
5. Solder two lead wires onto the new Erase Head. (When viewed from the back of the head, the two orange lead wires should not cross each other.)
6. Insert the two projections at the lower portion of the head into the holes of the CTL Head Base, and tighten the fixing screw while pushing it in the direction of the arrow.
7. Install the CTL Head Block on the unit.
   (Note) • The connector of the FE-18 Board should be inserted in the connector of the DR-254 Board properly.
   • If the connector is not inserted properly, "HUMID" indicator will appear on the display window, the condensation sensor will work, and the unit will stop its operation.
8. Install the shield plate and the DR-254 board.
9. After replacement, perform the adjustment in Section 4-39.

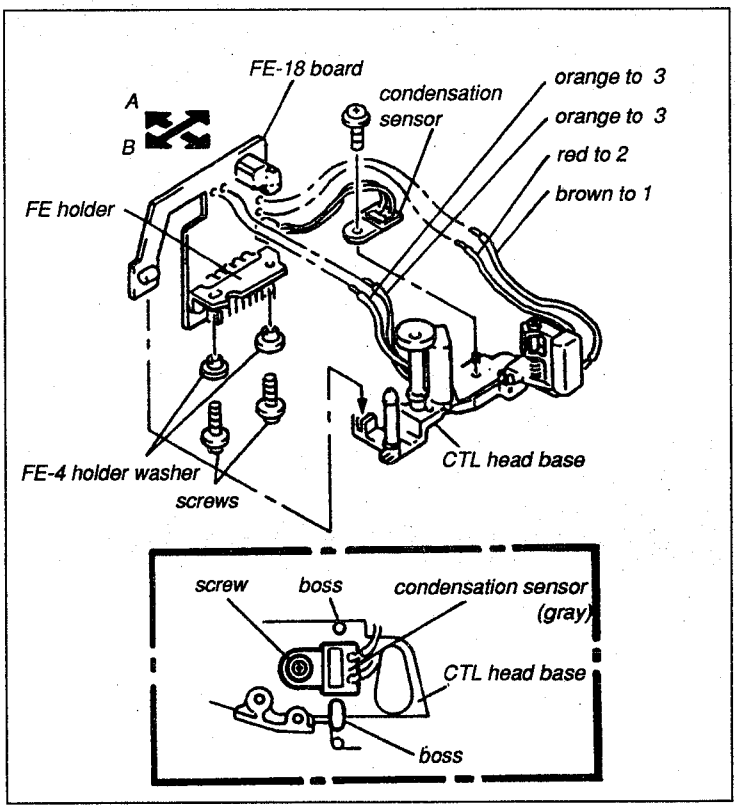


4-20-3. Replacement of the FE-18 Board

Mode: EJECT

Replacement procedure:

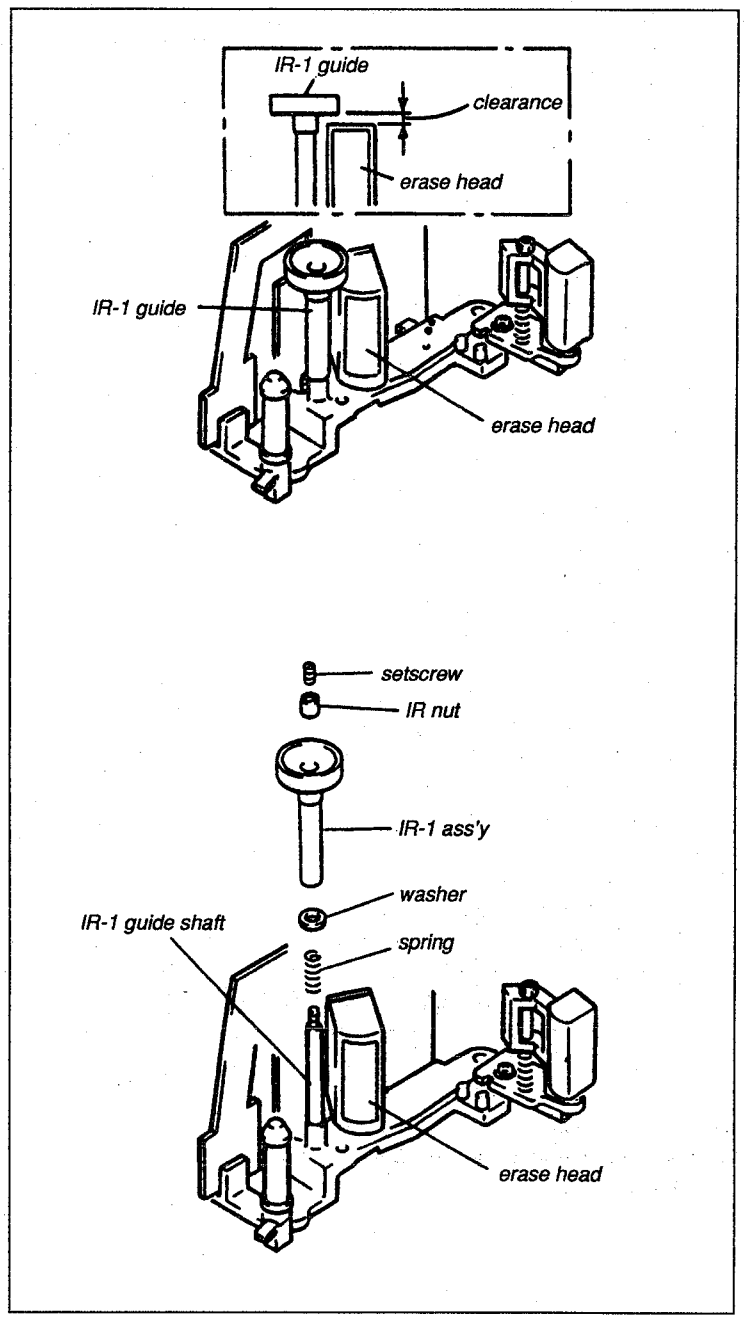
1. Remove the shield plate and the DR-254 board from the unit. (Refer to Section 4-20.)
2. Remove the CTL Head Block from the unit.
3. Remove the condensation sensor which is attached to the CTL Head Base.
4. Remove the two screws from the lower side of the CTL Head Block and remove the FE-18 Board. The FE-4 Holder Spacerers are inserted between the FE Holder and screw be sure not to lose them.
5. Unsolder the four lead wires on the FE-18 Board. Unsolder the two lead wires of the condensation sensor which was removed in Step 2 .
6. Solder the lead wire removed in Step 4 onto the new FE-18 Board. (The brown lead wire is soldered to 1, the red to 2, the two orange to 3.3, and the condensation sensors to 8.8)
7. Install the condensation sensor removed in Step 2 as shown in the figure so that it does not touch the boss of the base.
8. Pass the FE-4 Holder Spacer through the screw in the direction as shown in the figure and install the FE-4 Board on the CTL Head Base.
9. Check that the FE-18 Board is slightly shifted in the direction of the arrows A and B.
10. Install the CTL Head Block on the unit.
    (Note) • The connector of the FE-18 Board should be inserted in the connector of the DR-254 Board properly.
    • If the connector is not inserted properly, "HUMID" indicator will appear on the display window, the condensation sensor will work, and the unit will stop its operation.
11. Install the shield plate and the DR-254 board.
12. After replacement, perform the adjustment in Section 4-39.



4-20-4. Replacement of the IR-1 Guide (Impedance Roller Guide)

Tool: Thickness gauge
Tape guide adjustment screwdriver
Mode: EJECT
Replacement procedure:

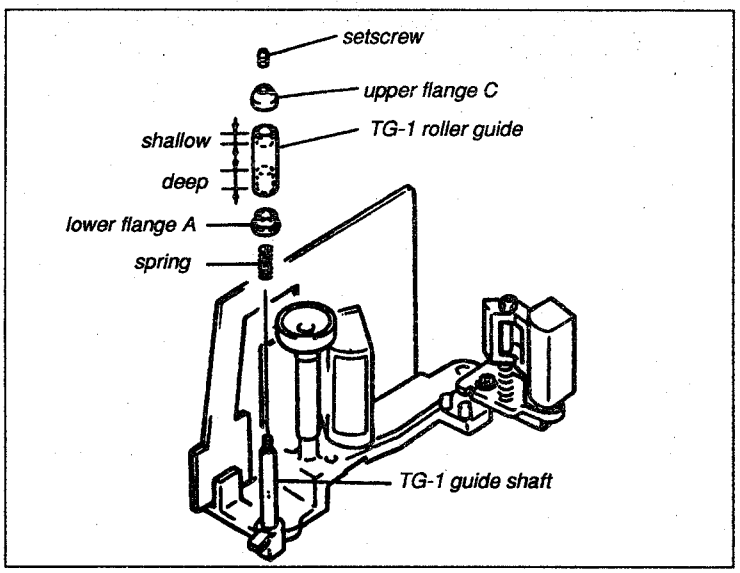
1. Measure the clearance between the lower surface of the IR-1 Guide's Upper Flange and Erase Head with the thickness gauge. (The clearance should be memorized.)
2. Loosen the setscrew at the top of the IR-1 Guide with the tape guide adjustment screwdriver.
3. Remove the IR Nut.
4. Remove the IR-1 Assembly, washer (1.4mm dia.), and compression spring from the IR-1 Guide Shaft.
5. Clean the IR-1 Guide Shaft with a cleaning piece moistened with cleaning fluid.
6. Install the compression spring and washer (1.4mm dia.) remove in Step 4 onto the IR-1 Guide Shaft.
7. Carefully insert the new IR-1 Assembly onto the IR-1 Guide Shaft.
8. Install the IR Nut.
9. Adjust the height of the IR-1 Guide using the IR Nut so that the clearance between the lower surface of the IR-1 Guide's Upper Flange and the Erase Head is the same as the clearance measured in Step 1.
10. Tighten the setscrew at the top of the guide with the tape guide adjustment screwdriver.
11. Recheck the clearance between the lower surface of the IR-1 Guide's Upper Flange and the Erase Head. When the clearance does not meet the required specification, repeat Steps 9 and 10.
12. After replacement, perform the adjustment in Section 4-39.



4-21. REPLACEMENT OF THE TG-1

Tool: Tape guide adjustment screwdriver
Mode: EJECT
Replacement procedure:

1. Loosen the setscrew at the top of the TG-1 with the tape guide adjustment screwdriver.
   To ensure that the Upper Flange C does not change the position, turn the setscrew again until its bottom reaches the top of the TG-1 guide shaft. At this time, be careful not to tighten up the setscrew.
2. Remove the Upper Flange C in the counterclockwise direction.
3. Remove the TG-1 Roller Guide, Lower Flange A, and the compression spring.
4. Clean the TG-1 Guide Shaft with a cleaning piece moistened with cleaning fluid.
5. Insert the compression spring removed in Step 3 onto the TG-1 Guide Shaft.
6. Carefully insert the Lower Flange A and the TG-1 Roller Guide onto the TG-1 Guide Shaft in the direction as shown in the figure.
7. Attach the Upper Flange C with the setscrew on to the TG-1 guide shaft.
8. Tighten the setscrew at the top of the guide with the tape guide adjustment screwdriver.
9. After replacement, perform the adjustment in Section 4-39.



4-22. REPLACEMENT OF THE A/T HEAD

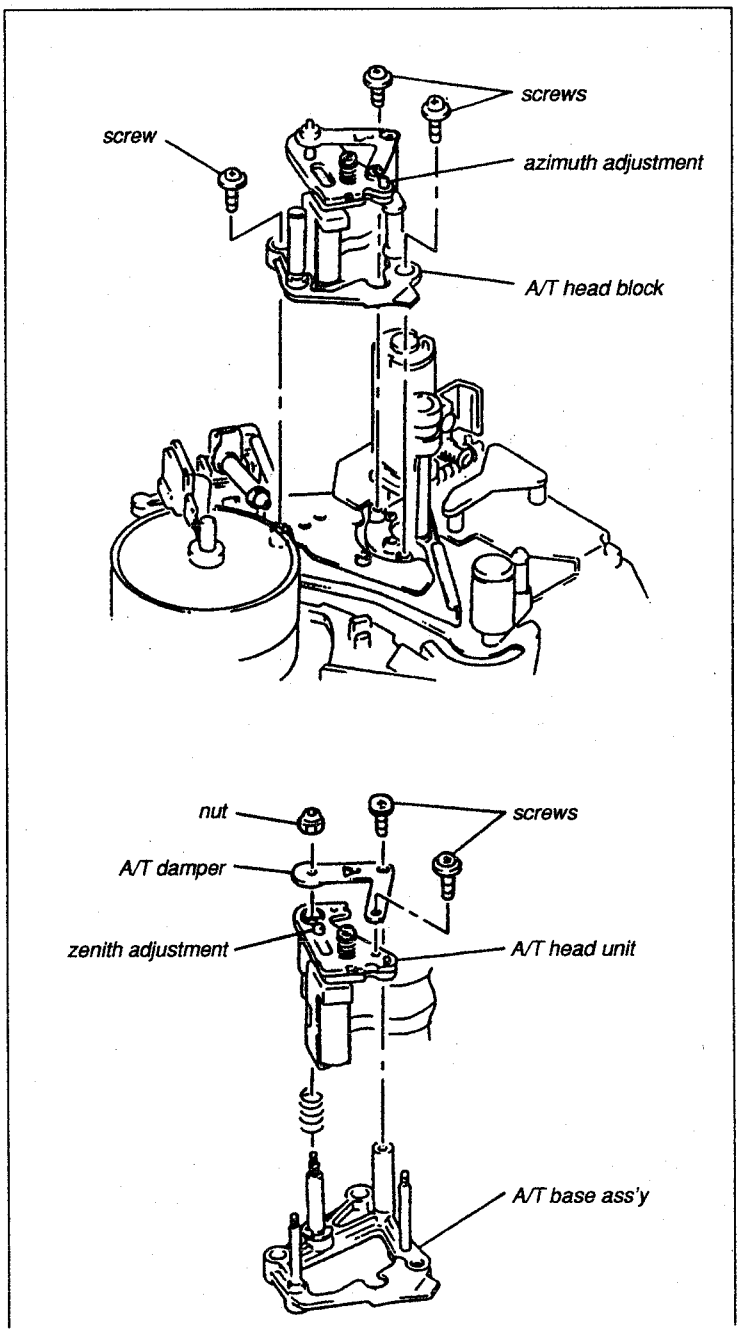
- When replacing the A/T Head, be careful not to loosen or tighten the azimuth adjustment screw and zenith adjustment screw shown in the figure.

Tool: Plate parallel
Thickness gauge
Tweezers
Flatness check tool

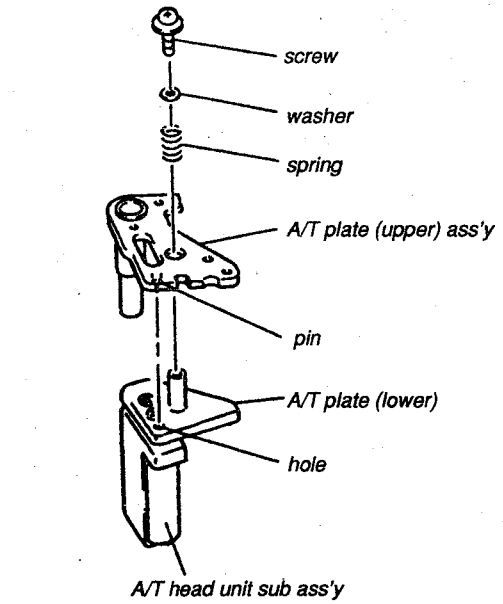
Mode: EJECT

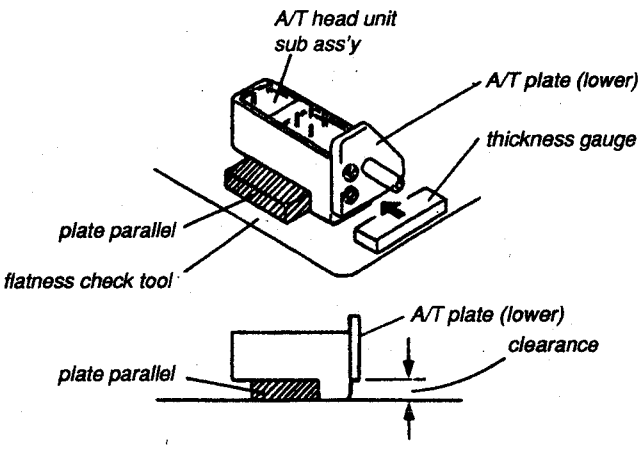
Replacement procedure:

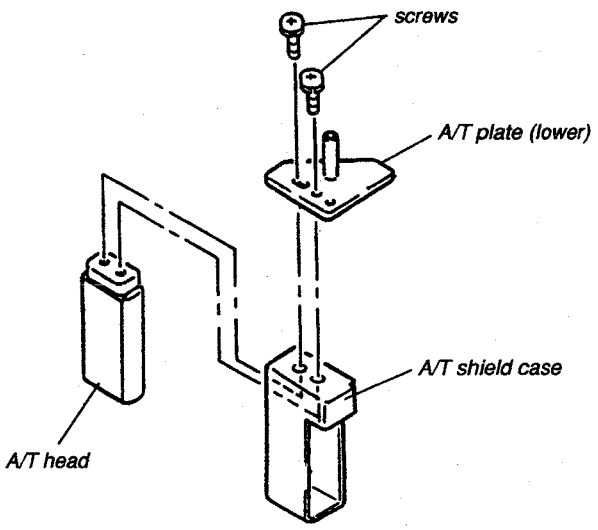
1. Remove the flexible board (FL-160 Board) of the A/T Head Block which is connected to connector CN2 of the AU-185 Board and connector CN306 of the SS-57 Borad with the tweezers. (Refer to Section 2-13).
2. Remove the three fixing c screws of the A/T Head Block and remove the A/T Head Block from the unit. Be careful not to damage the flexible board (FL-160 Board).
3. Unsolder the six terminals of the FL-160 Board soldered to the A/T Head and remove the FL-160 Board from the A/T Head Block.
4. Remove the two screws and one nut shown in the figure, then remove the A/T Head Unit from the A/T Head Block.



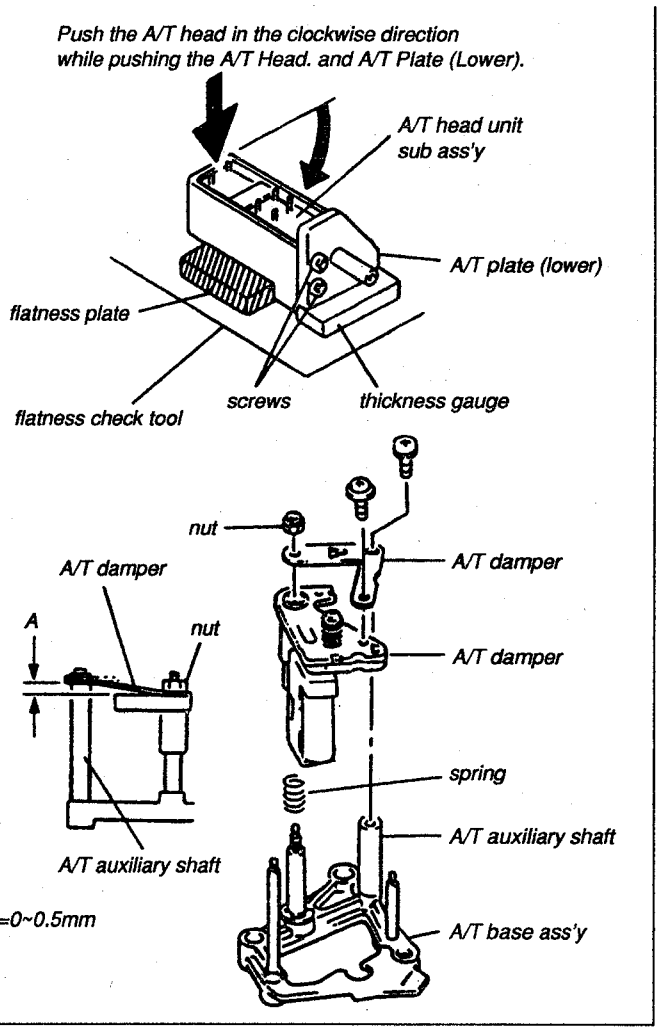
5. Remove the screw located in the center of the A/T Head Unit and remove the A/T Head Unit Sub Assembly from the A/T Plate (Upper) Assembly.
6. As shown in the figure, put the flatness plate on the flatness check tool and place the A/T Head Unit Sub Assembly (removed in Step 5) on it.
7. Check the clearance between the flatness check tool and the edge of the A/T Plate (Lower) with the thickness guage.
8. Remove the two screws shown in the figure, remove the A/T Head and A/T Shield Case from the A/T Plate (Lower), and replace the new A/T Head. Thread the two screws on the head snugly but do not tighten.
9. Put the A/T Head Unit Sub Assembly on the flatness check tool as in Step 6 and insert the thickness gauge checked in Step 7 between the A/T Plate (Lower) and flatness check tool.







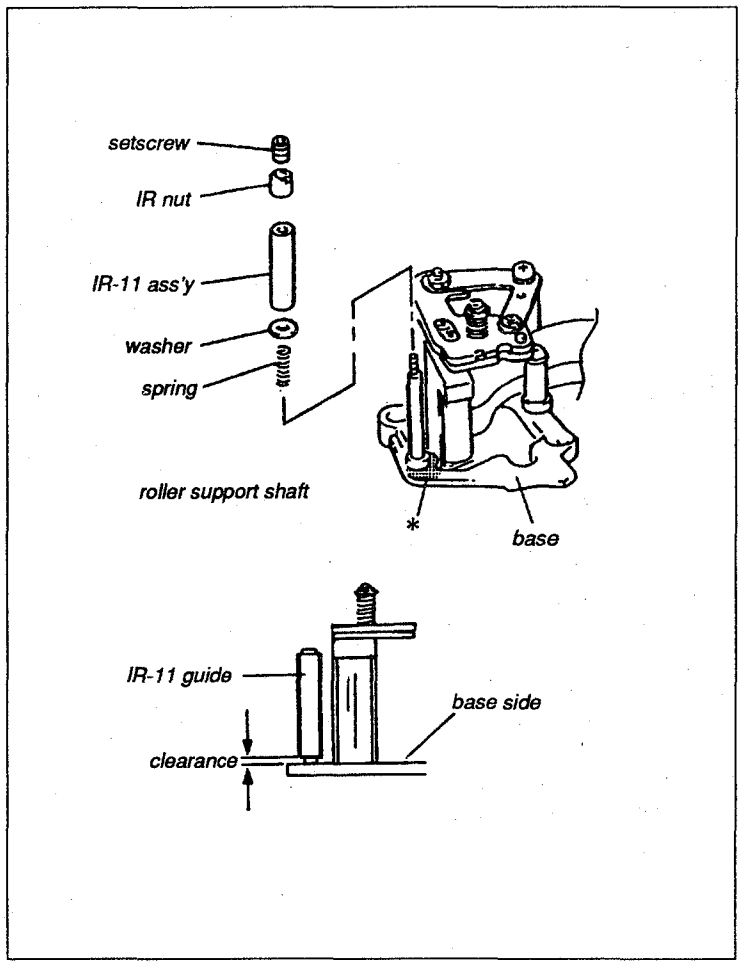
10. Push the A/T Head and A/T Plate (Lower) towards the flatness check tool, then push only the A/T Head in the clockwise direction further, and tighten the two A/T Head fixing screws.
11. Install the A/T Head Unit Sub Assembly on the A/T Plate (Upper) Assembly by reversing the Step 5 . Check that the pin of the A/T Plate (Upper) Assembly is inserted into the hole of the A/T Plate (Lower).
12. Install the A/T Head Unit on the A/T Base Assembly. As shown in the figure, adjust the nut so that clearance A (See next page) between the tip of the A/T Auxiliary Shaft and A/T Plate (Upper) Assembly meets the required specification as viewed.
13. Assemble the A/T Head Block in the unit by reversing the Steps 1 through 3 .
14. After replacement, perform the adjustment in Section 4-39.



4-23. REPLACEMENT OF THE IR-11 GUIDE

Tool: Thickness gauge
Tape guide adjustment screwdriver
Mode: EJECT
Replacement procedure:

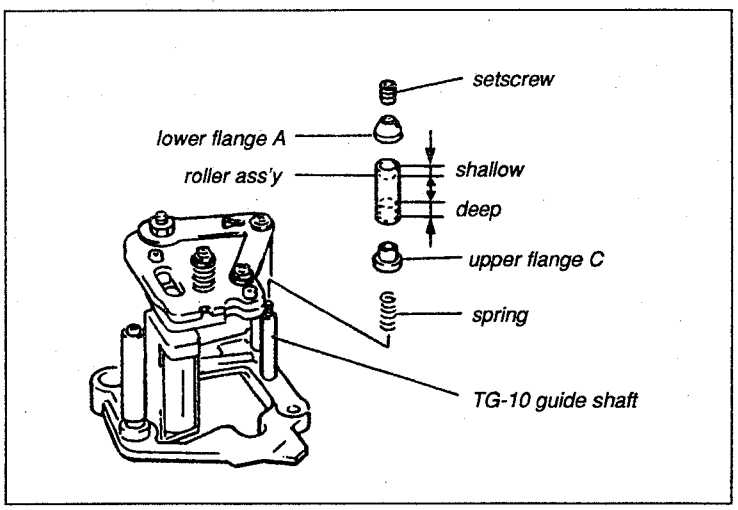
1. Measure the clearance between the lower surface of an IR-11 guide and the base side with the thickness gauge.
   Measure at the * part of the base.
   (The clearance should be memorized.)
2. Loosen the setscrew at the top of the IR-11 Guide with the tape guide adjustment screwdriver.
3. Remove the IR nut.
4. Remove an IR-11 guide, washer (1.4mm dia.), and compression spring from the roller support shaft.
5. Clean the roller support shaft with a cleaning piece moistened with cleaning fluid.
6. Install the compression spring and washer (1.4mm dia.) removed in Step 4 onto the roller support shaft.
7. Carefully insert the new IR-11 guide onto the roller support shaft.
8. Install the IR Nut.
9. Adjust the height of the IR-11 Guide using the IR Nut so that the clearance between the lower surface of the IR-11 Guide and the base side is the same as the clearance measured in Step 1.
10. Tighten the setscrew at the top of the guide with the tape guide adjustment screwdriver.
11. Recheck the clearance between the lower surface of the IR-11 Guide and the base side. When the clearance does not meet the required specification, repeat Steps 9 and 10 .
12. After replacement, perform the adjustments in Section 4-39.



4-24. REPLACEMENT OF THE TG-10

Tool: Tape guide adjustment screwdriver
Mode: EJECT
Replacement procedure:

1. Loosen the setscrew at the top of the TG-10 with the tape guide adjustment screwdriver.
   To ensure that the Upper Flange C does not change the position, turn the setscrew again until its bottom reaches the top of the TG-10 guide shaft.
   At this time, be careful not to tighten up the setscrew.
2. Remove the Upper Flange C.
3. Remove the Roller Assembly, Lower Flange A, and the compression spring.
4. Clean the TG-10 Guide Shaft with a cleaning piece moistened with cleaning fluid.
5. Insert the compression spring removed in Step 3 onto the TG-5 Guide Shaft.
6. Carefully insert the Lower Flange A and the Roller Assembly onto TG-10 Guide Shaft in the direction shown in the figure.
7. Attach the Upper Flange C with the setscrew on to the TG-10 guide shaft.
8. Tighten the setscrew at the top of the guide with the tape guide adjustment screwdriver.
9. After replacement, perform the adjustments in Section 4-39.

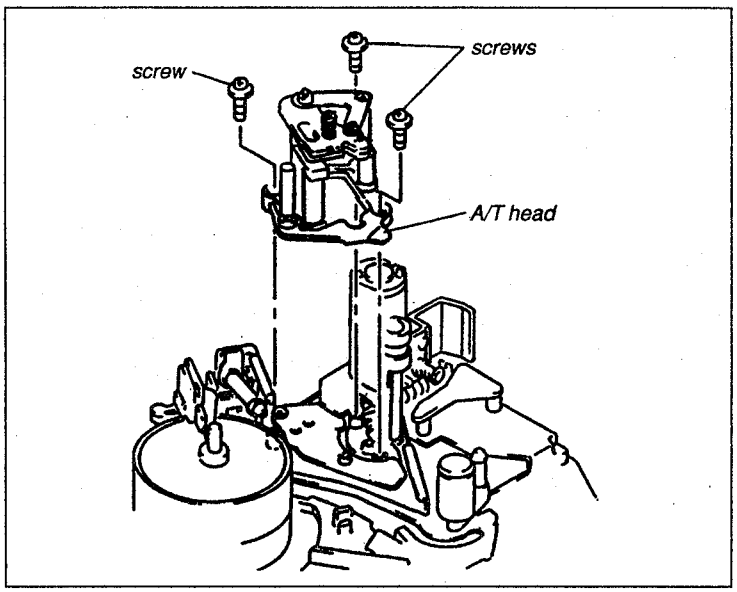


4-25. REPLACEMENT OF THE COMPONENT PARTS OF THE TAKE-UP SIDE SUB BASE

- The T Sub Base Block consists of the TG-8 and the Slant Guide. Replacement of the above componenets is described below.
- When replacing the above components, remove the A/T Head Block from the unit. The removal and installation procedures are described below.

Tool: Tweezers
Mode: EJECT
Removal and installation Procedures:

- Remove the flexible board (FL-160 Board) of the A/T Head Block which is connected to connector CN2 of the AU-185 Board and connector CN306 of the SS-57 Board with the tweezers. (Refer to Section 2-13.)
- Remove the three fixing screws of the A/T Head Block and remove the A/T Head Block from the unit. Be careful not to damage the flexible board (FL-160 Board) and A/T Head.
- Install by reversing the above.
- When replacing the component of the T Sub Base, not to remove the frame of the T Sub Base (T Sub Rotation Table) and T Sub Adjustment Plate from the unit.

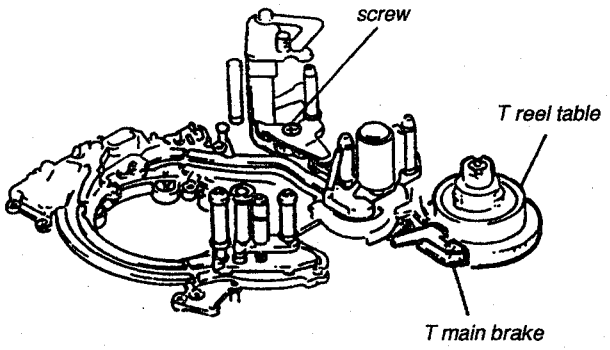


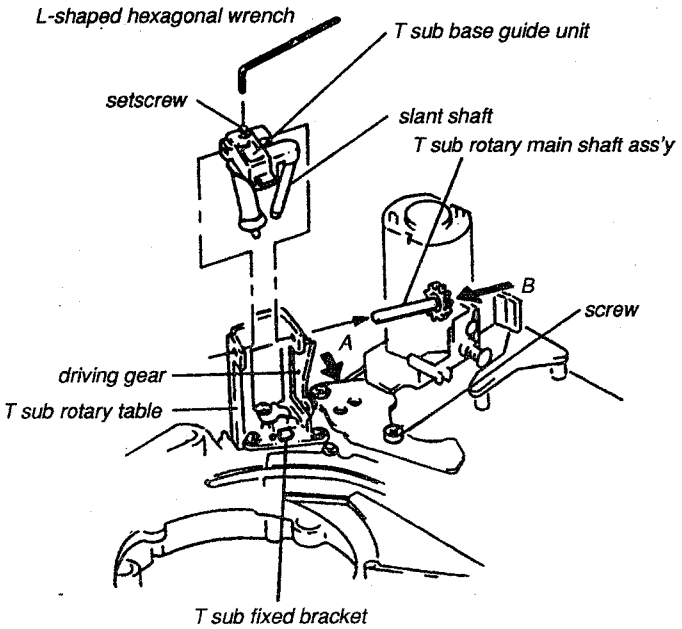
4-25-1. Replacement of the TG-8

- TG-8 is the component part of the T Sub Base Block.

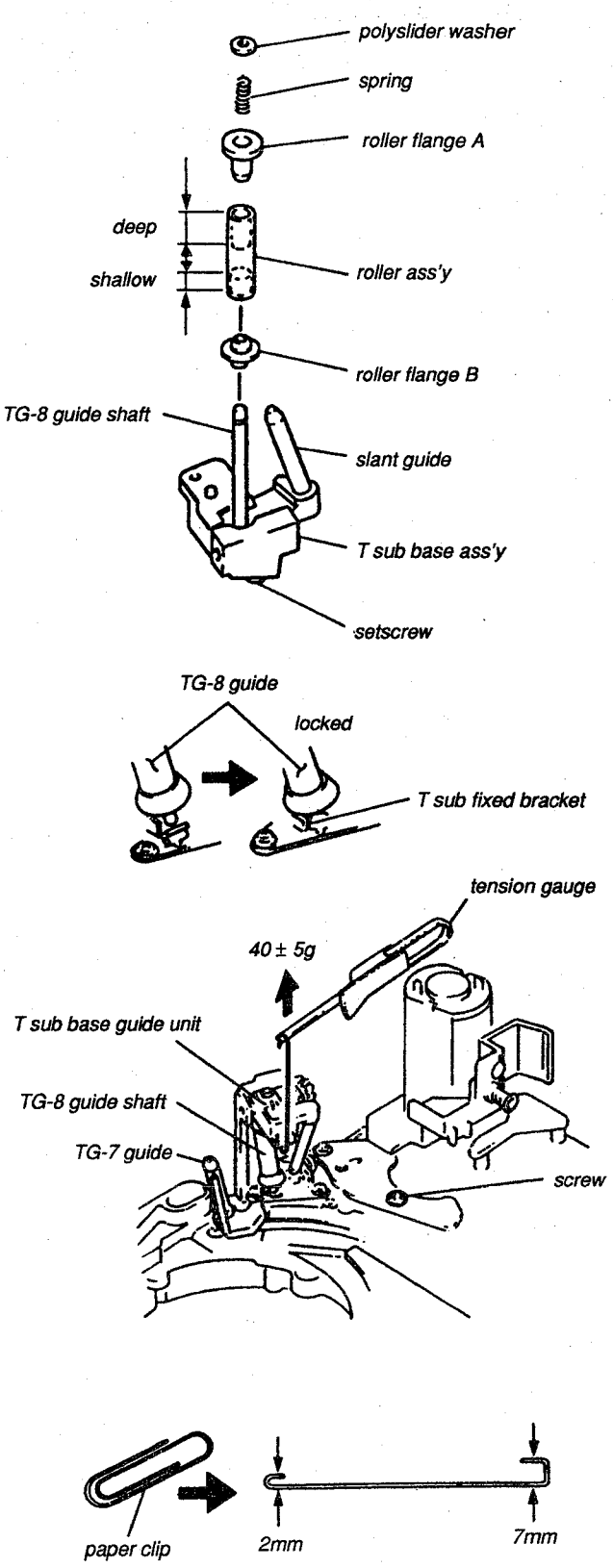
Tool: L-shaped hexagonal wrench (across flat has 0.89mm.)
Tension gauge (50g full scale)
Mode: EJECT → Threading end→ EJECT
Replacement procedure:

1. Turn the screw clockwise until each of the tape guides are at position of the threading end as shown in the figure. Keep turning clockwise until the T Main Brake is pressed against the T Reel.
2. Remove the A/T Head Block from the unit.
3. Loosen the setscrew at the top of the T Sub Base by turning two or three times with the L-shaped hexagonal wrench.
4. Pull the T Sub Rotary Main Shaft Assembly to the A/T head side. Then, the T Sub Base Guide Unit can be removed.





5. Remove the polyslider washer from the top of the TG-8 Guide.
6. Remove the compression spring, Roller Flange A, Roller Assembly (TG-8), and Roller Flange B from the TG-8 Guide Shaft.
7. Clean the TG-8 Guide Shaft with a cleaning piece moistened with cleaning fluid.
8. Carefully insert the Roller Flange B, Roller Assembly (TG-8), and Roller Flange A onto the TG-8 Guide Shaft in the direction as shown in the figure.
9. Insert the compression spring onto the TG-8 Guide Shaft, then push the 1.2mm diameter polyslider washer on the shaft.
10. Install the assembled T Sub Base Guide Unit onto the T Sub Rotary Table with the T Sub Rotary Table with the T Sub Rotary Main Shaft assembly. (Do not tighten the setscrew too much.)
11. Slowly turn the screws mentioned in Steps 1 counterclockwise until the T Sub Fixed Bracket touches the T Sub Rotary Table. (At that time, do not move the Driving Gear of the T Sub Rotary Table.)
12. Push the top edge of the TG-8 Guide Shaft onto the T Sub Rotary Table side (the opposite side to the drum).
13. Turn the screws clockwise until the T Main Brake is pressed against the T Reel Table as described in Step 1.
14. While pushing the Driving Gear in the direction of the arrow A and T Sub Rotary Main Shaft Assembly in the direction of the arrow B, tighten the setscrew.
15. Turn the screw described in Step 1 so that the top edge of the TG-8 is locked by the T Sub Fixed Bracket.
16. Reform the small paper clip as shown in the figure.
17. Insert the reformed paper clip into the hole of the T Sub Base Guide Unit and hang the tension gauge on the other end.
18. Move the tension gauge in the upward direction to the unit until it shows 40 ± 5g. (Never applied 50g or more.)
19. Turn the screw described in Step 1 clockwise, and check that the top edge of the TG-8 Guide is firmly locked by the T Sub Fixed Bracket. When threading or unthreading check that the TG-8 Guide Roller and the TG-7 Guide are not touching. If the specification is not satisfied, perform the Step 14 again. At that time, change the degree of pressure a little when pushing in the direction of arrow A.

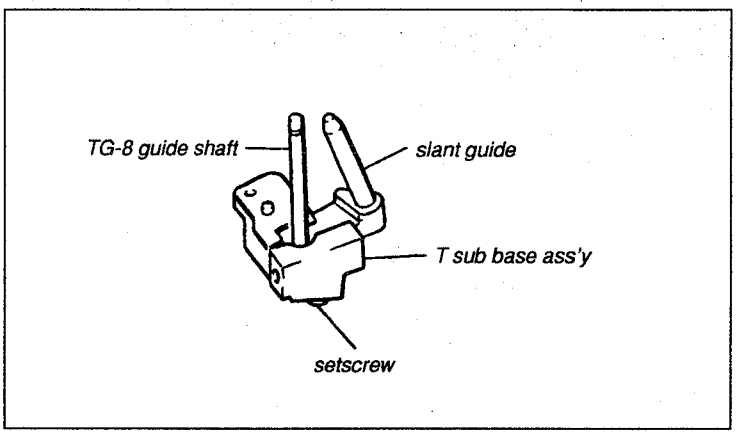


4-25-2. Replacement of the Slant Guide

• The Slant Guide is the component part of the T Sub Base Block.

Tool: L-shaped hexagonal wrench (across flat has 0.89mm dia.)
Mode: EJECT → Threading end → EJECT
Replacement procedure:

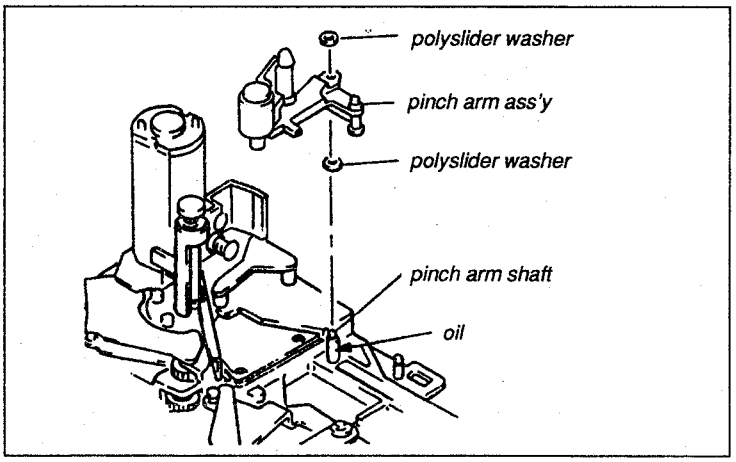
1. The same as in Steps 1 through 6 of Section 4-25-1.
2. Remove the setscrew from the removed T Sub Base Assembly and install it on the new T Sub Base Assembly.
3. Clean the TG-8 Guide Shaft of the T Sub Base Assembly and Slant Guide with a cleaning piece moistened with cleaning fluid.
4. Assemble as described in Steps 8 through 19)of Section 4-25-1.
5. After replacement, perform the adjustments in Section 4-39.



4-26. REPLACEMENT OF THE PINCH ARM ASSEMBLY

Tool: Tweezers
Mode: EJECT
Replacement procedure:

1. Remove the Pinch Arm Lock Lever from the unit. (Refer to Section 4-16.)
2. Remove the polyslider washer fixing the Pinch Arm Assembly and remove the assembly from the unit.
3. Clean the Pinch Arm Shaft with a cleaning piece moistened with cleaning fluid.
4. Apply an 1/4 drop of Sony oil on the Pinch Arm Shaft.
5. Install the new Pinch Arm Assembly.
6. Insert the polyslider washer (1.2mm dia.) onto the shaft and fasten the Pinch Arm Assembly.
7. Install the Pinch Arm Lock Lever. (Refer to Section 4-16.)
8. After replacement, perform the adjustment in Section 4-39.

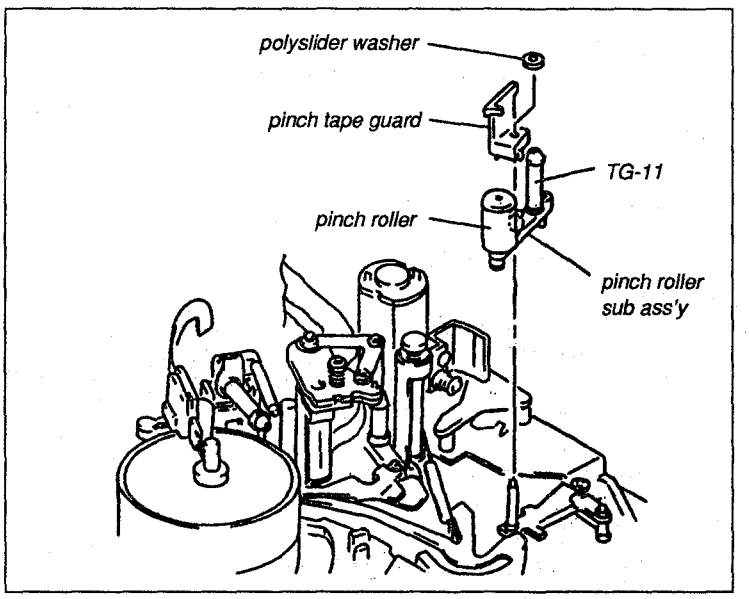


4-27. REPLACEMENT OF THE PINCH ROLLER SUB ASSEMBLY

- The TG-11 Guide is installed on the shaft of the Pinch Roller sub Assembly.
- When replacing the Pinch Roller Sub Assembly, the TG-11 Guide must be replaced at the same time.
  (Refer to Section 4-28.)

Tool: Tweezers
Mode: EJECT
Replacement procedure:

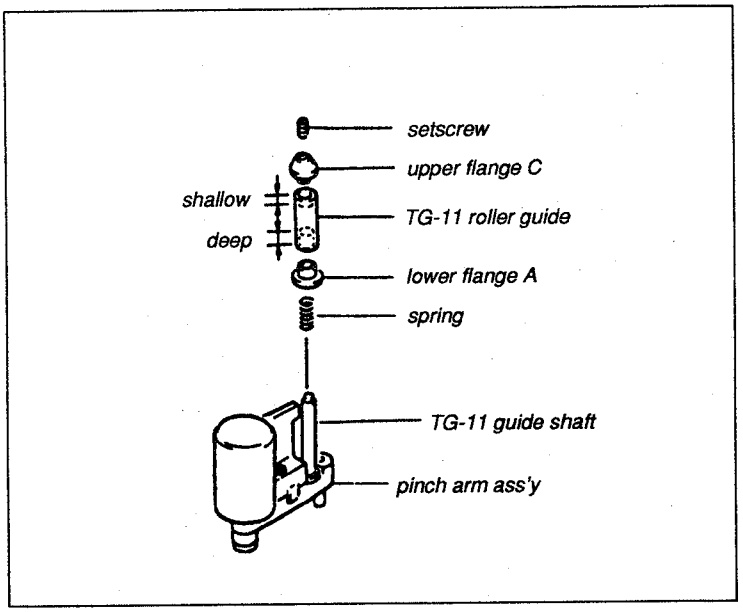
1. Remove the polyslider washer fixing the Pinch Roller Sub Assembly onto the Pinch Arm Assembly.
2. Remove the Pinch Tape Guard and the Pinch Roller Sub Assembly from the unit.
3. Install the TG-11 Guide of the old Pinch Roller Sub Assembly onto the new Pinch Roller Sub Assembly as described in Section 4-28.
4. After installing the Pinch Roller Sub Assembly and the Pinch Tape Guard on the Pinch Arm Assembly, push a polyslider washer onto the shaft.
5. Clean the pinch roller with a cleaning piece moistened with cleaning fluid.
6. After replacing, perform the adjustment in Section 4-39.



4-28. REPLACEMENT OF THE TG-11

Tool: Tape guide adjustment screwdriver
Mode: EJECT
Replacement procedure:

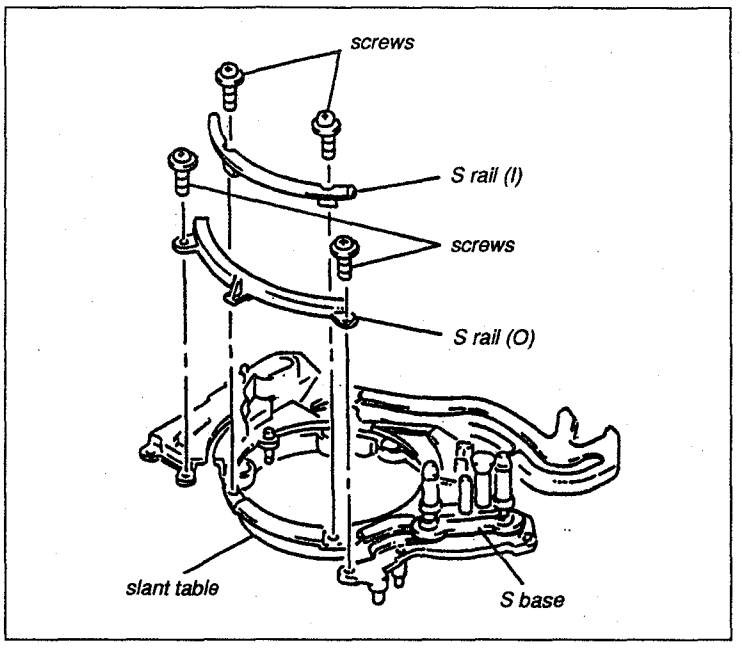
1. Loosen the setscrew at the top of the TG-10 with the tape guide adjustment screwdriver.
   To ensure that the Upper Flange C does not change the position, turn the setscrew again until its bottom reaches the top of the TG-11 guide shaft.
   At this time, be careful not to tighten up the setscrew.
2. Remove the Upper Flange C.
3. Remove the TG-11 Roller Guide, Lower Flange A, and the compression spring.
4. Clean the TG-11 Guide Shaft with a cleaning piece moistened with cleaning fluid.
5. Insert the compression spring removed in Step 3 onto the TG-11 Shaft.
6. Carefully insert the Lower Flange A and the TG-11 Roller Guide onto the TG-11 Guide Shaft in the direction as shown in the figure.
7. Attach the Upper Flange C with the setscrew on to the TG-11 guide shaft.
8. Tighten the setscrew at the top of the guide with the tape guide adjustment screwdriver.
9. After replacement, perform the adjustment in Section 4-39.



4-29. REPLACEMENT OF THE SUPPLY SIDE RAIL (I)

Mode: EJECT
Replacement procedure:

1. Remove the Drum Assembly from the unit. (Refer to Section 4-3.)
2. Remove the two screws on the S Rail (I) and remove it from the unit.
3. Install the new S Rail (I) on the unit so that the clearance between the new S Rail (I) and S Rail (O) is 3.1 to 3.4mm.
4. Repeat threading and unthreading two or three times and check that they can be done smoothly.
5. Install the Drum Assembly on the unit.
6. After replacement, perform the adjustments in Section 4-39.



4-30. REPLACEMENT OF THE SUPPLY SIDE RAIL (O)

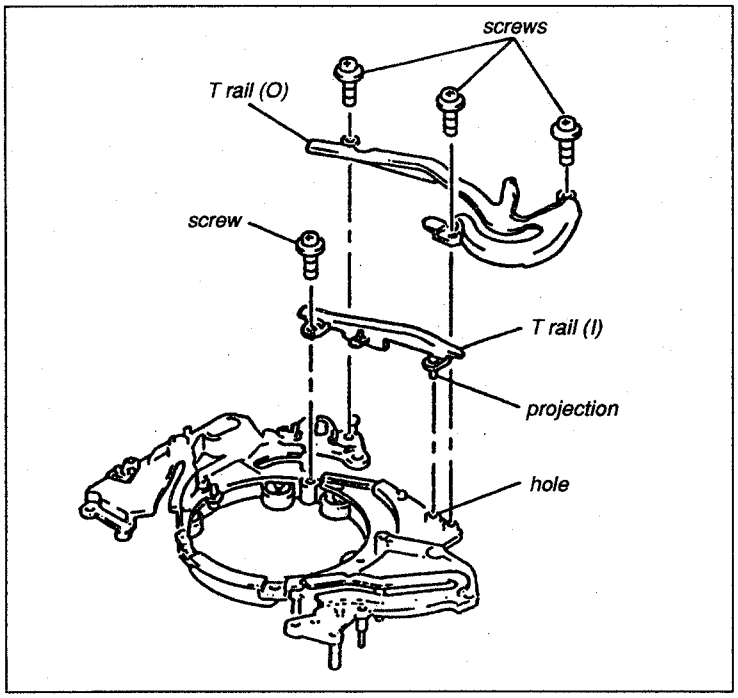
Mode: EJECT
Replacement procedure:

1. Remove the two screws of the S Rail (O) and remove it from the unit.
2. Install a new S rail (O) on the unit so that the clearance between the new S Rail (O) and S Rail (I) is 3.1 to 3.4mm.
3. Repeat threading and unthreading two or three times and check that they can be done smoothly.

4-31. REPLACEMENT OF THE TAKE-UP SIDE RAIL (I)

Mode: Threading end
Replacement procedure:

1. Remove the Drum Assembly from the unit. (Refer to Section 4-3.)
2. Remove a fixing screw on the T Rail (I) and remove it from the unit.
3. Install the new T Rail (I) so that its projection is inserted into the chassis hole and the clearance between the new T Rail (I) and T Rail (O) is 3.1mm to 3.5mm.
4. Repeat threading and unthreading two or three times and check that they can be done smoothly.
5. Install the Drum Assembly on the unit.
6. After replacement, perform the adjustments in Section 4-39.



4-32. REPLACEMENT OF THE TAKE-UP SIDE RAIL(O)

Mode: Threading end
Replacement procedure:

1. Remove the three fixing screws of the T Rail (O) and remove it.
2. Install the new T Rail (O) on the unit so that the clearance between the new T Rail (O) and T Rail (I) is 3.1 to 3.5mm.
3. Repeat threading and unthreading two or three times and check that they can be done smoothly.

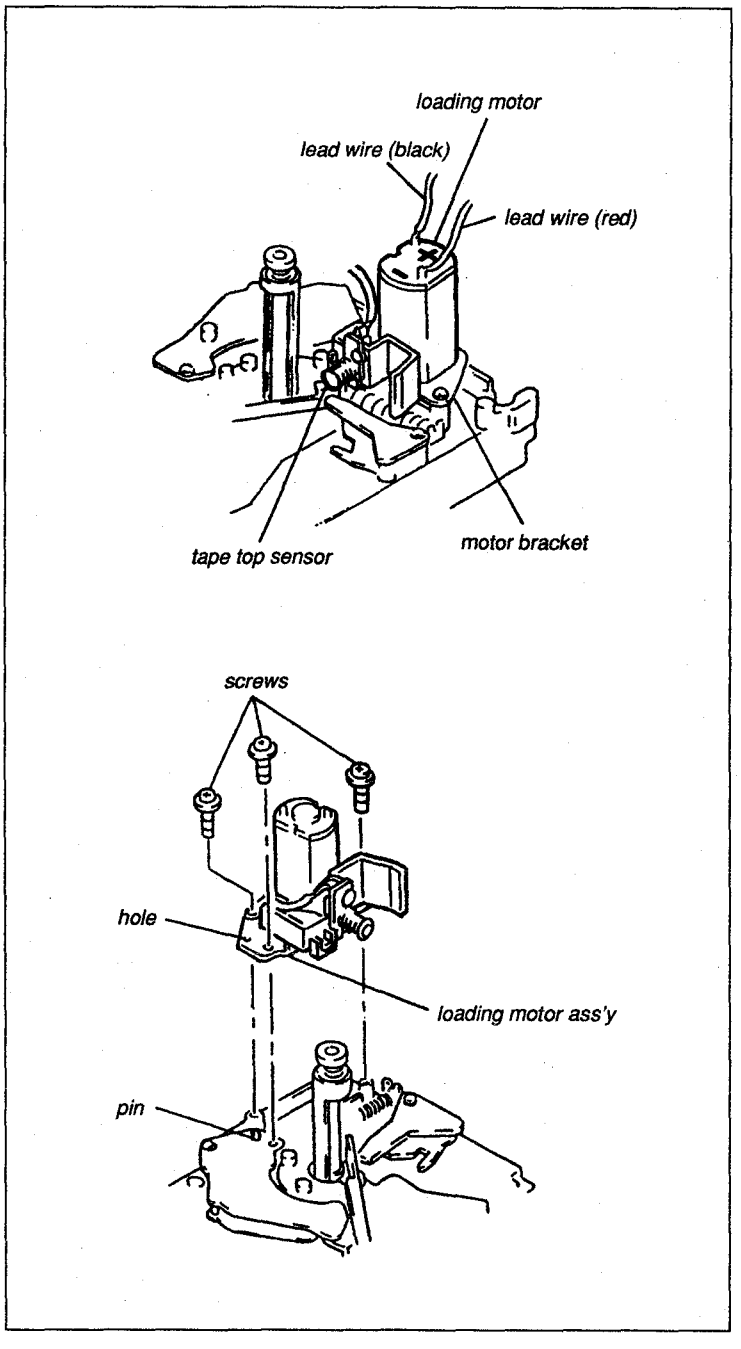
4-33. REPLACEMENT OF THE LOADING MOTOR

- When replacing the Loading Motor, replacement of the Loading Motor Assembly is recommended.

Mode: EJECT

Replacement procedure:

1. Remove the connector for the leading motor attached to the CN305 on the SS-S7 board, and the connector for the tape-top sensor attached to the CN308.
2. Remove the three screws shown in the figure, then remove the Loading Motor Assembly from the unit.
3. After inserting the chassis pin into the hole of the new Loading Motor Assembly, install the Loading Motor Assembly, install the Loading Motor Assembly with the three fixing screws.
4. Assemble by reversing the Steps 1, 2 and 3 .



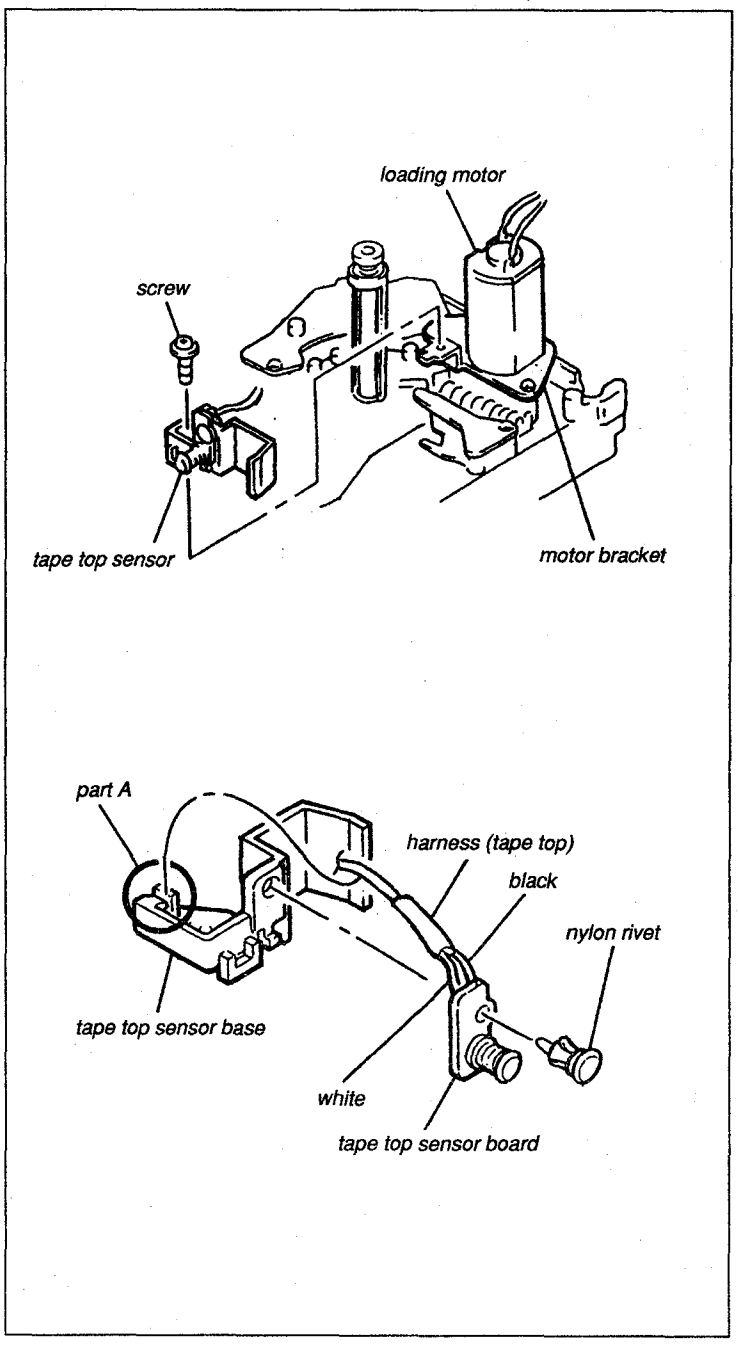
4-33-1. REPLACEMENT OF TAPE TOP SENSOR

The tape top sensor is a part of the loading motor assembly.

Mode: EJECT

Replacement procedure:

1. Remove the screw shown in the figure and remove the tape top sensor from the motor bracket.
2. Disconnect the connector of the harness (tape top) from CN308 of the SS-57 Board.
3. Remove the nylon rivet shown in the figure and remove the tape top sensor board from the tape top sensor base.
4. Pass the new harness (tape top) through part A of the tape top sensor base and attach it in the reverse order of steps 1, 2, and 3 .

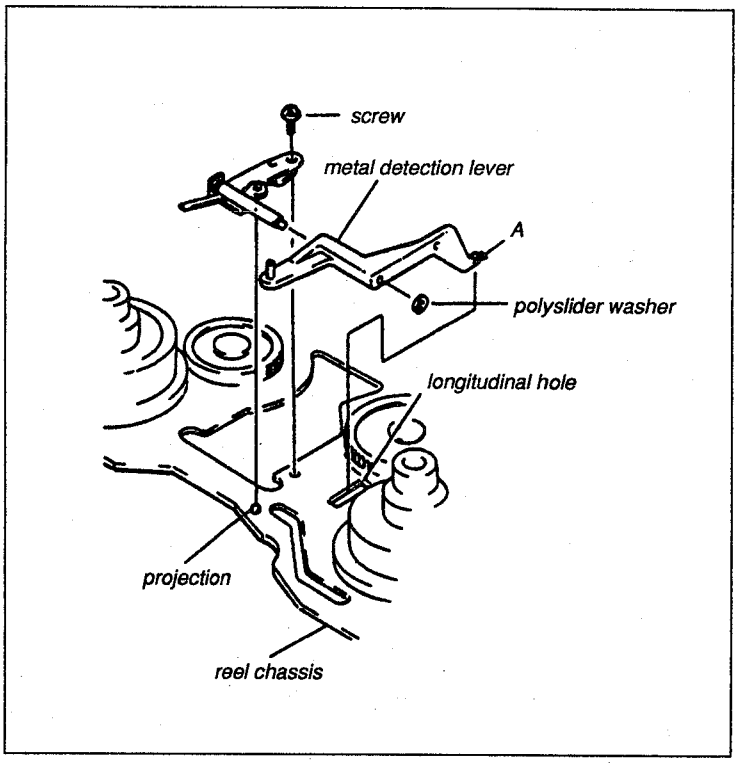


4-34. REPLACEMENT OF THE METAL DETECTION LEVER

Mode: EJECT

Replacement procedure:

1. Remove the Brake Slider referring to Section 4-14.
2. Remove a screw of the Metal Detection Lever and remove it from the unit.
3. Remove the polyslider washer of the Metal Detection Lever and replace it with a new one.
4. Install the Metal Detection Lever with the 1.2mm diameter polyslider washer.
5. Install the Metal Detection Lever on the chassis and fix it with the fixing screw so that portion A of the Metal Detection Lever is inserted into the logitudinal hole and the projection of the reel chassis is inserted into the hole of the Metal Detection Lever.
6. Install the Brake Slider referring to Section 4-14.

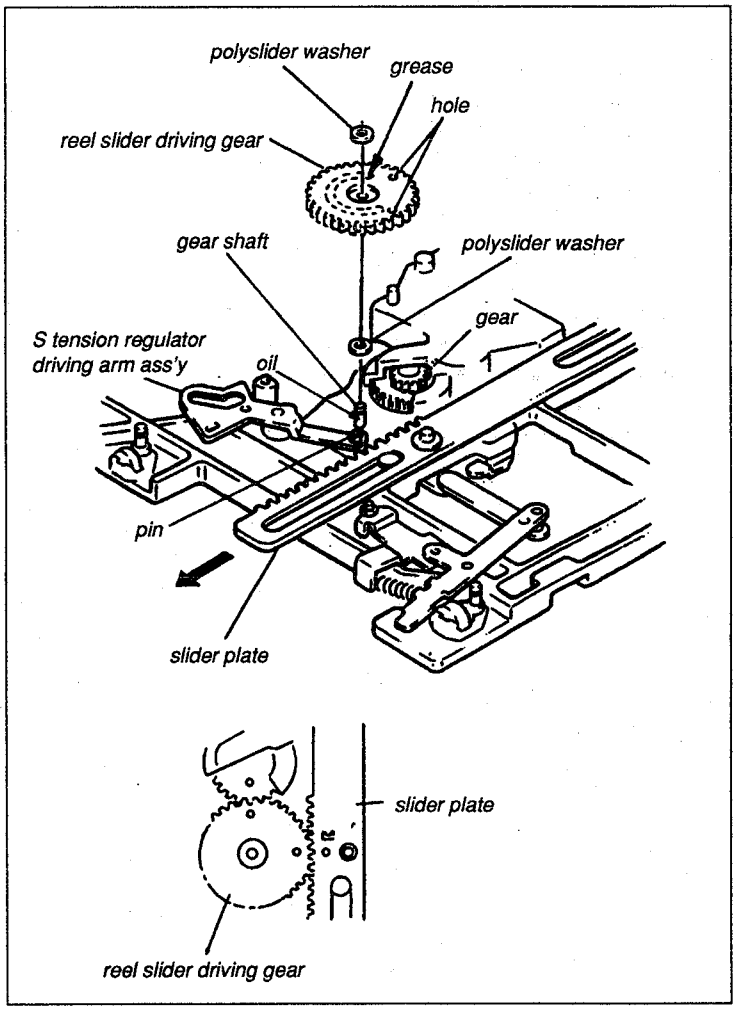


4-35. REPLACEMENT OF THE REEL SLIDER DRIVING GEAR

- When replacing this part, remove the Reel Chassis from the Mechanical Deck Block. (Refer to Section 2-12.)

Tool: Sony grease
Sony oil
Mode: EJECT
Replacement procedure:

1. Remove the Reel Chassis. (Refer to Section 2-12.)
2. Remove the polyslider washer fixing the Reel Slider Driving Gear, then remove the Reel Slider Driving Gear and the polyslider washer (1.6mm dia.).
3. Clean the Gear Shaft with a cleaning piece moistened with cleaning fluid.
4. Install the polyslider washer (1.6mm dia.) on the shaft.
5. Apply an 1/4 drop of Sony oil on the shaft.
6. Smear a little Sony grease onto the groove of the new Reel Slider Driving Gear.
7. Move the Slider manually in the direction of the arrow until it stops.
8. Insert the Reel Slider Driving Gear into the shaft so that the pin of the S Tension Regulator Driving Arm Assembly is into the groove of the Driving Gear, and so that the positional relationship between the holes on the other gear and the slider plate and two holes of the Driving Gear as shown in the figure.
9. Push the polyslider washer (1.2mm dia.) onto the shaft and fasten the Reel Slider Driving Gear.
10. Install the Reel Chassis. (Refer to Section 2-12.)

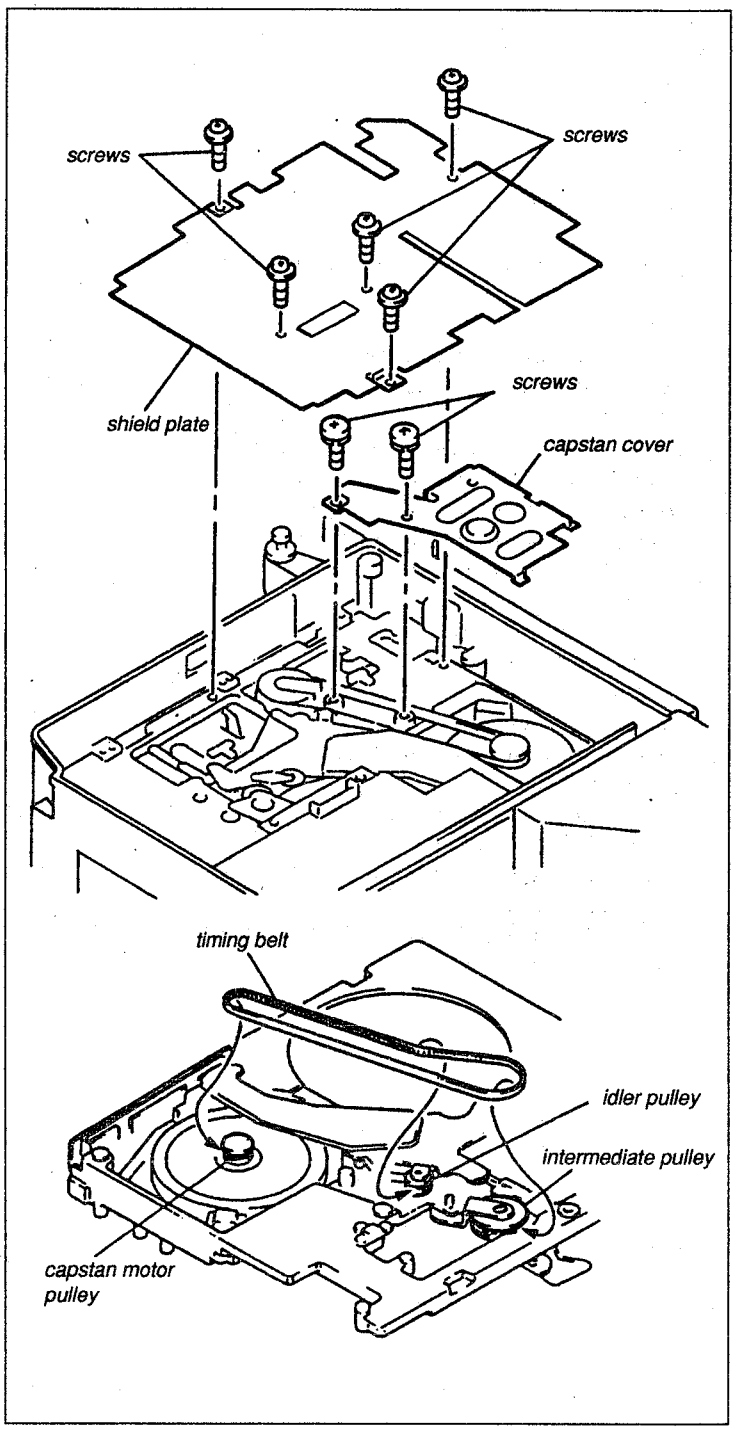


4-36. REPLACEMENT OF THE TIMING BELT

Mode: EJECT

Replacement procedure:

1. Remove the SS-57 Board. (Refer to Section 2-11-7.)
2. Remove the five screws attaching the shield plate and remove the shield plate.
3. Remove the two screws attaching the capstan cover and remove the capstan cover.
4. Remove the Timing Belt.
5. Place the new Timimg Belt on the Capstan Motor Pulley, the Intermediate Pulley, then on the Idler Pulley in that order.
6. Attach in the reverse order of steps 1, 2, and 3.
7. Adjust the tension of the timing belt. (Refer to Section 5-1.)

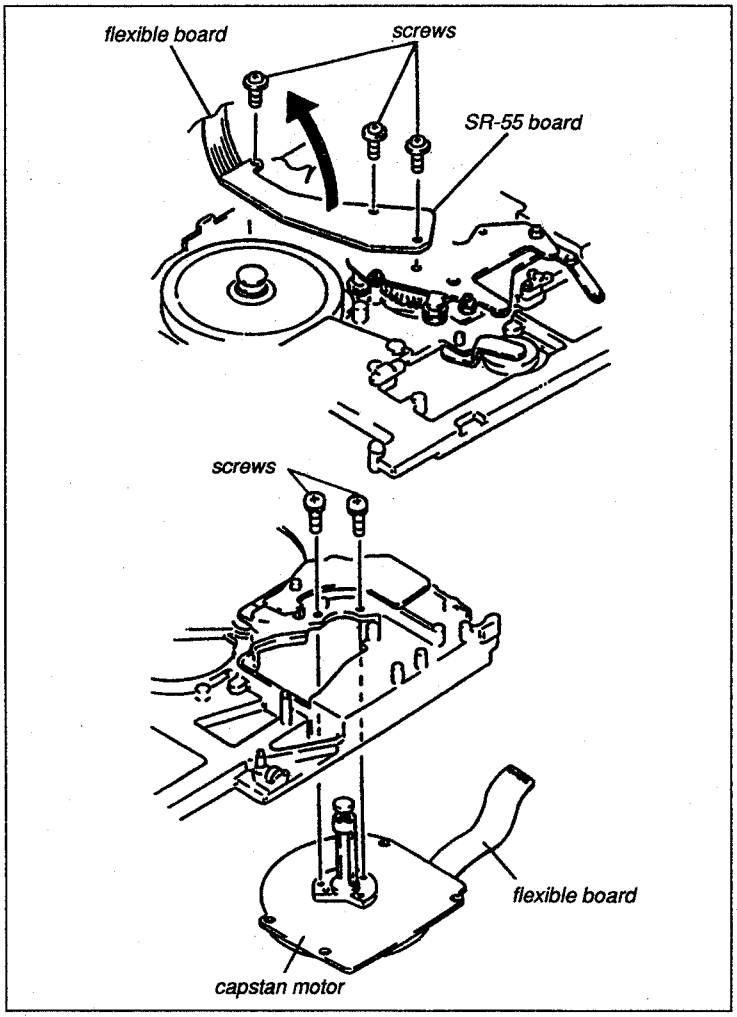


4-37. REPLACEMENT OF THE CAPSTAN MOTOR

Mode: EJECT

Replacement procedure:

1. Remove the SS-57 Board. (Refer to Section 2-11-7.)
2. Remove the shield plate and capstan cover. (Refer to Section 4-36.)
3. Remove the DR-254 Board. (Refer to Section 2-11-3.)
4. Remove the three screws attaching the SR-55 Board and open the SR-55 Board toward the flexible board side.
5. Remove the two fixing screws on the Capstan Motor, then remove the Capstan Motor from the unit.
6. Install the new Capstan Motor on the Mechanical Deck Block by reversing the Steps 1 through 5 . (Note) It is recommended for easy installing that the tip of the flexible board makes flat.
7. Adjust the tension of the timing belt. (Refer to Section 5-1.)
8. Perform the compression lever position check. (Refer to Section 5-2.)
9. Perform the pinch compression lever position adjustment. (Refer to Section 5-3.)
10. Perform the tape threading/unthreading check. (Refer to Section 6-3.)
11. Perform the tape path check (near the pinch roller). (Refer to Section 6-5.)
12. Perform the tape path adjustment (PLAY mode). (Refer to Section 6-1.)
13. Perform the tape path check (FF, REW mode). (Refer to Section 6-2.)

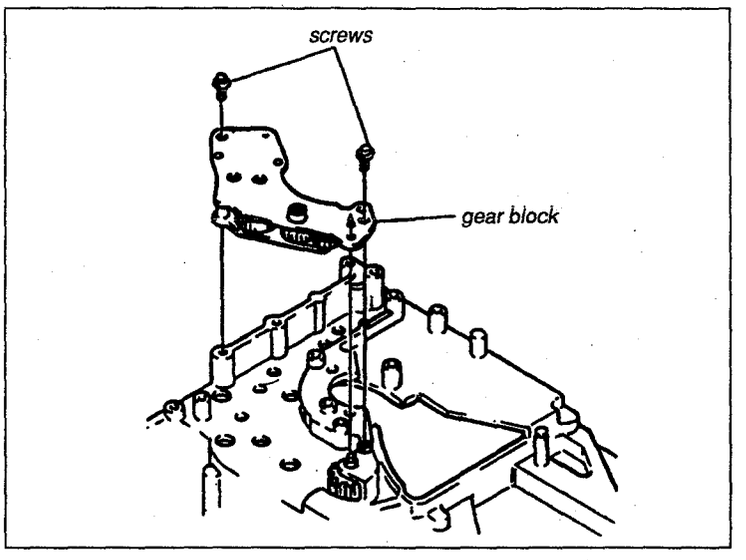


4-38. REPLACEMENT OF THE GEAR BLOCK

Mode: EJECT

Replacement procedure:

1. Remove the Loading Motor as described in Section 4-33, and remove the A/T Head Block as in Section 4-22.
2. Remove the two fixing screws as shown in the figure, remove the Gear Block, and replace with a new one.
3. Install the A/T Head Block and the Loading Motor Block as described in Sections 4-22 and 4-33.



4-39. ITEMS TO BE ADJUSTED AFTER THE MAIN PARTS REPLACEMENT

(NUMBERS IN PARENTHESIS REFER TO SECTION NOS.)

Replacement of the Upper Drum Assembly

Brush Position Adjustment (6-16) → Tracking Adjustment (6-8) → Tape Path Adjustment (PLAY mode)(6-1) → Tape Path Check (FF,REW mode)(6-2) → CTL Head Height Adjustment (6-9) → CTL Head Position Adjustment (6-10) → TC Head Position Adjustment (6-12) → Audio Head Height Adjustment (6-13) → TC Head Position Adjustment (check)(6-12) → Audio Head Phase Adjustment (6-14) → PB Switching Position Adjustment (6-15) → Video Alignment(11)

Replacement of the Drum Assembly

Tracking Adjustment (6-8) → Tape Path Adjustment (PLAY mode)(6-1) → Tape Path Check (FF, REW mode)(6-2) → CTL Head Height Adjustment (6-9) → CTL Head Position Adjustment (6-10) → TC Head Position Adjustment (6-12) → Audio Head Height Adjustment (6-13) → TC Head Position Adjustment (check)(6-12) → Audio Head Phase Adjustment (6-14) → PB Switching Position Adjustment (6-15) → Servo Check (9) → Video Alignment (11)

Replacement of the S Reel Table

Tension Regulator Operating Position Adjustment (5-7) → PLAY Back Tension Adjustment (check)(6-4)

Replacement of the Tension Regulator Band

Tension Regulator Operating Position Adjustment (5-7) → PLAY Back Tension Adjustment (6-4)

Replacement of the Tension Regulator

Tension Regulator Operation Position Adjustment (5-7) → Tape Path Adjustment (PLAY mode)(6-1) → Tape Path Check (FF, REW mode)(6-2) → PLAY Back Tension Adjustment (6-4) → Tracking Adjustment (check)(6-8)

Replacement of the TG-7

Threading Position Check (Take-up side)(5-5) → Tape Threading/Unthreading Check (6-3) → Tape Path Adjustment (PLAY mode)(6-1) → Tape Path Check (FF, REW mode)(6-2) → Tracking Adjustment (check)(6-8)

Replacemet of the Component Parts of the T Base

Threading Position Check (Take-up side)(5-5) → Tape Threading/Unthreading Check (6-3) → Tape Path Adjustment (PLAY mode)(6-1) → Tape Path Check (FF, REW mode)(6-2) → Tracking Adjustment (6-8) → Tape Path adjustment (PLAY mode)(check)(6-1) → Tape Path check (FF, REW mode)(6-2) → CTL Head Height Adjustment (check)(6-9) → CTL Head Position Adjustment (check)(6-10) → TC Head Position Adjustment (6-12) → Audio Head Height Adjustment (6-13) → TC Head Position Adjustment (check)(6-12) → Audio Head Phase Adjustment (6-14) → PB Switching Position Adjustment (6-15)

Replacement of the TG-4

Threading Position Check (Supply side)(5-4) → Tape Threading/Unthreading Check (6-3) → Tracking Adjustment (check)(6-8) → Tape Path Adjustment (PLAY mode) (check)(6-1) → Tape Path Check (FF, REW mode)(6-2) → CTL Head Height Adjustment (check)(6-9)

Replacement of the TG-5
Threading Position Check (Supply side)(5-4) → Tape Threading/Unthreading check (6-3) → Tracking Adjustment (6-8) → Tape Path Adjustment (PLAY mode)(check) (6-1) → Tape Path Check (FF, REW mode)(6-2) → CTL Head Height Adjustment (check)(6-9)

Replacement of the IR-2
Threading Position Check (Supply side)(5-4) → Impedance Roller Guide II Clearance Adjustment (5-6) → Tape Threading/Unthreading Check (6-3) → Tracking Adjustment (check)(6-8) → Tape Path Adjustment (PLAY mode)(check) (6-1) → Tape Path Check (FF, REW mode)(6-2) → CTL Head Height Adjustment (check)(6-9)

Replacement of the S Sub base
Threading Position Check (Supply side)(5-4) → Impedance Roller Guide II
Clearance Adjustment (5-6) → Tape Threading/Unthreading Check (6-3) → Tracking Adjustment (check)(6-8) → Tape Path Adjustment (PLAY mode)(check) (6-1) → Tape Path Check (FF, REW mode)(6-2) → CTL Head Height Adjustment (check)(6-9) → CTL Head Position Adjustment (check)(6-10) → TC Head Position Adjustment (check)(6-12)

Replacement of the Component Parts of the S Base
Threading Position Check (Supply side)(5-4) → Impedance Roller Guide 2 Clearance Adjustment (check)(5-6) → Tape Threading/Unthreading Check (6-3) → Tracking Adjustment (check)(6-8) → Tape Path adjustment (PLAY mode)(check) (6-1) → Tape Path Check (FF, REW mode)(6-2) → CTL Head Height Adjustment (6-9) → CTL Head Position Adjustment (6-10) → TC Head Position Adjustment (6-12) → Audio Head Height Adjustment (6-13) → TC Head Position Adjustment (check)(6-12) → Audio Head Phase Adjustment (6-14) → PB Switching Position Adjustment (6-15)

Replacement of the CTL Head
Tracking Adjustment (check)(6-8) → Tape Path Adjustment (PLAY mode)(check) (6-1) → Tape Path Check (FF, REW mode)(6-2) → CTL Head Height Adjustment (6-9) → CTL Head Position Adjustment (6-10) → TC Head Position Adjustment (6-12)

Replacement of the Erase Head and the FE-18 Board
Tracking Adjustment (check)(6-8) → Tape Path Adjustment (PLAY mode)(check) (6-1) → Tape Path Check (FF, REW mode)(6-2) → CTL Head Position Adjustment (6-10) → TC Head Position Adjustment (6-12)

Replacement of the IR-1 Guide (Impedance Roller Guide), TG-1 Guide, IR-11 Guide, and the TG-10 Guide
Tape Path Adjustment (PLAY mode)(check)(6-1) → Tape Path Check (FF, REW mode)
(6-2)

4. REPLACEMENT OF THE MAJOR PARTS

Replacement of the A/T Head
Audio Head Zenith Adjustment (6-11) → Tape Threading/Unthreading Check (6-3) → Tracking Adjustment (check)(6-8) → Tape Path Adjustment (PLAY mode)(check) (6-1) → Tape Path Check (FF, REW mode)(6-2) → Audio Head Height Adjustment (6-13) → Audio Head Phase Adjustment (6-14) → Audio Alignment (10)

Replacement of the TG-8 Guide and the Slant Guide
Tape Threading/Unthreading Check (6-3) → Tracking Adjustment (check)(6-8) → Tape Path Adjustment (PLAY mode)(check)(6-1) → Tape Path Check (FF, REW mode)(6-2) → Audio Head Height Adjustment (6-13) → Audio Head Phase Adjustment (6-14)

Replacement of the Pinch Arm Assembly and the Pinch Roller Sub assembly
Pinch Press Lever Position Adjustment (5-3) → Tape Threading/Unthreading Check (6-3) → Tape Path Check (Around the Pinch Roller)(6-5) → Tape Path Adjustment (PLAY mode)(6-1) → Tape Path Check (FF, REW mode)(6-2)

Replacement of the TG-11
Tape Threading/Unthreading Check (6-3) → Tape Path Check (Around the Pinch Roller)(6-5) → Tape Path Adjustment (PLAY mode)(6-1) → Tape Path Check (FF, REW mode)(6-2)

Replacement of the S Rail (I)
Threading Position Check (Supply side)(5-4) → Tape Threading/Unthreading Check (6-3) → Tracking Adjustment (check)(6-8) → Tape Path Adjustment (PLAY mode)(check)(6-1) → Tape Path Check (FF, REW mode)(6-2) → CTL Head Height Adjustment (6-9) → CTL Head Position Adjustment (6-10) → TC Head Position Adjustment (6-12) → Audio Head Height Adjustment (6-13) → TC Head Position Adjustment (check)(6-12) → Audio Head Phase Adjustment (6-14) → PB Switching Position Adjustment (6-15)

Replacement of the T Rail (I)
Threading Position Check (Take-up side)(5-5) → Tape Threading/Unthreading Check (6-3) → Tracking Adjustment (check)(6-8) → Tape Path Adjustment (PLAY mode)(check)(6-1) → Tape Path Check (FF, REW mode)(6-2) → CTL Head Height Adjustment (6-9) → CTL Head Position Adjustment (6-10) → TC Head Position Adjustment (6-12) → Audio Head Height Adjustment (6-13) → TC Head Position Adjustment (check)(6-12) → Audio Head Phase Adjustment (6-14) → PB Switching Position Adjustment (6-15)

SECTION 5
LINK SYSTEM ALIGNMENT

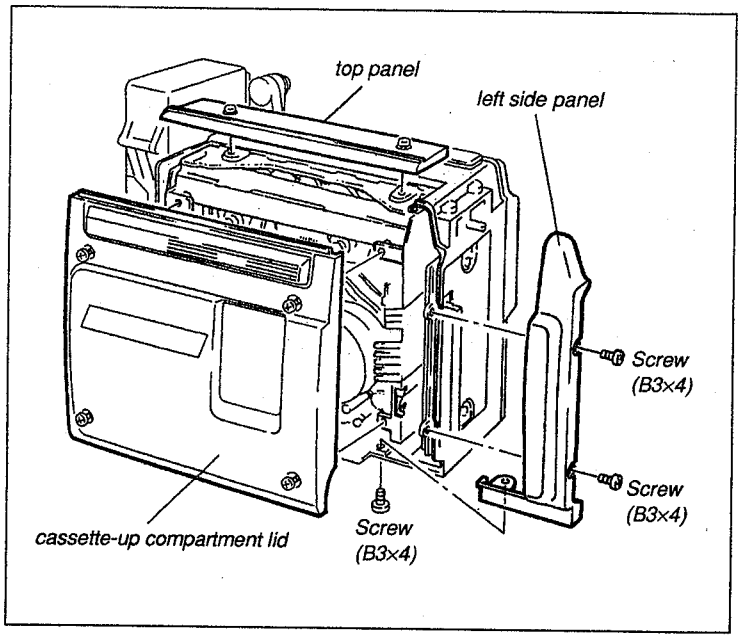
(Preparations)

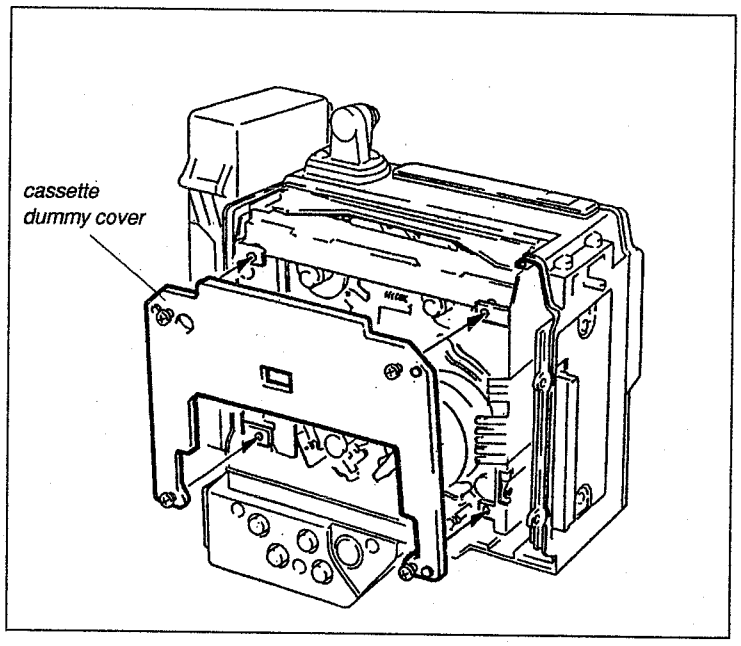
1. VTR's Mechanical Deck Block Adjustment

Adjust the VTR's mechanical deck block as follows.

1. Put the VTR into the threading end mode.
2. Remove the Top Panel.
3. Remove the Cassette-up Compartment Lid and install the Cassette Dummy Cover which is prepared for service.
4. Remove three screws(B3×4) and remove the Left Side Panel.

Precaution:
Be careful not to damage the flexible card since the lid is connected with the main unit by the flexible card.



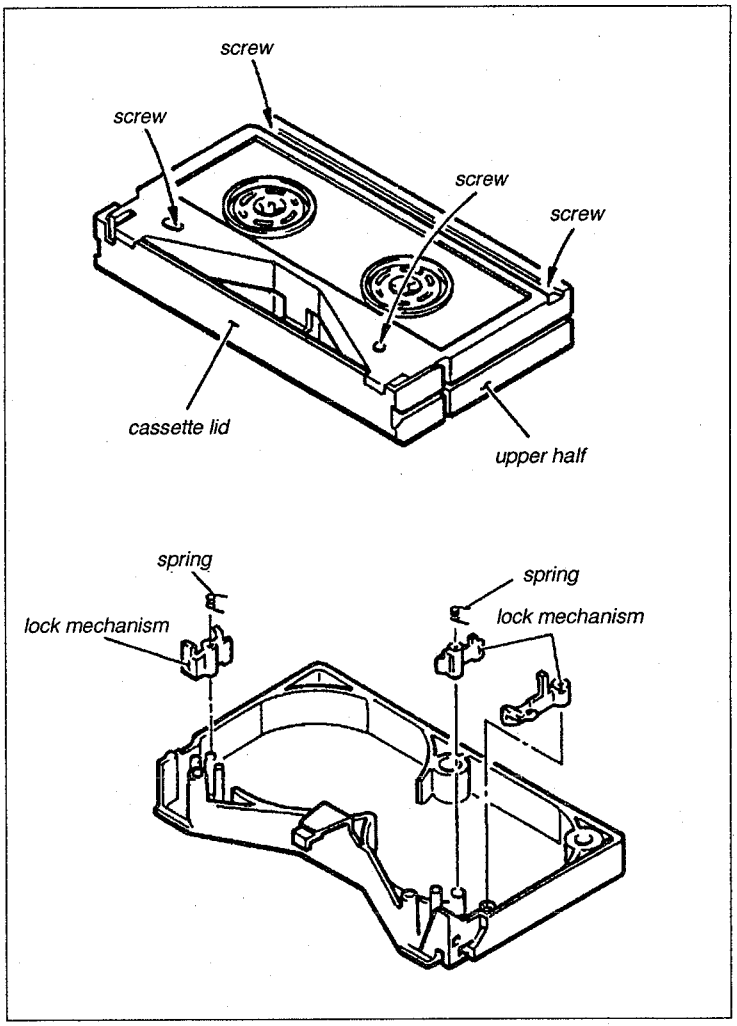


2. Creating the Blank Cassette/Cassette Tape without Lid/Alignment Tape without Lid

Since the VTR is designed to compact size, some mechanical checks and adjustments cannot be performed when a cassette tape lid or cassette tape is installed. Remove the cassette tape lid or cassette tape as follows:

- **Creating the blank cassette**

1. Remove the four fixing screws on the back of a cassette tape and remove the upper half of the cassette tape as shown in the figure.
2. Remove the lock mechanism parts and the springs on the left and right.
3. Remove the cassette lid from the upper half.
4. Remove the cassette tape.
5. Install the upper half on the lower half with the four fixing screws from the back side.

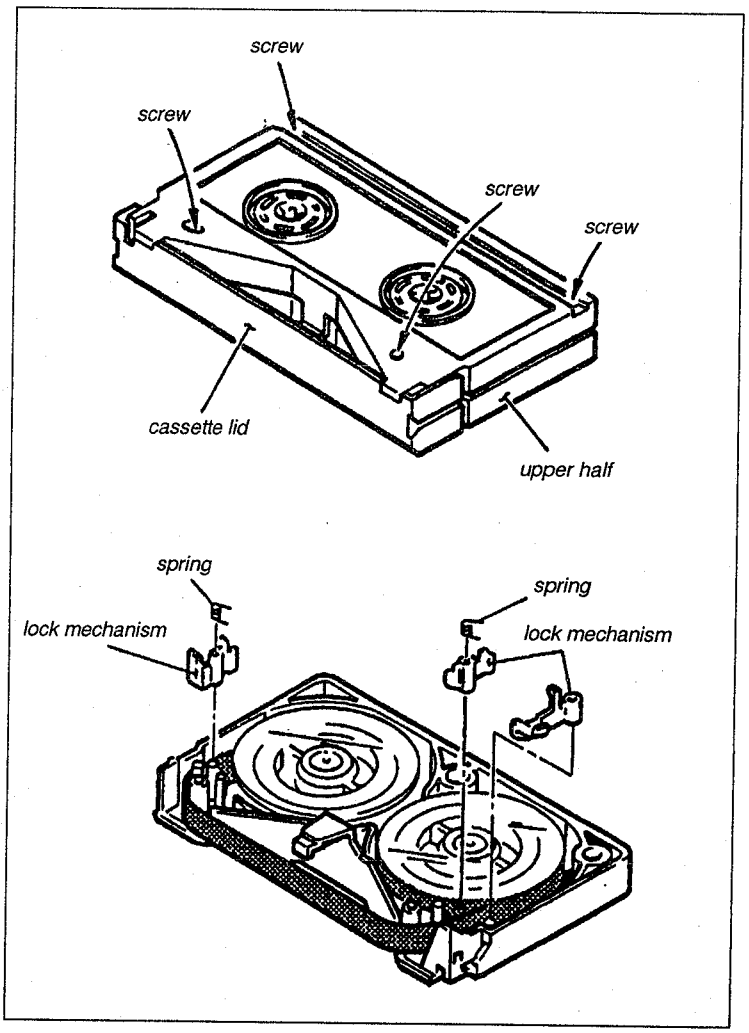


- **Creating the Cassette Tape without Lid**

1. Remove the four fixing screws on the back of a cassette tape and remove the upper half of the cassette tape as shown in the figure.
2. Remove the lock mechanism parts and the springs on the left and right.
3. Remove the cassette lid from the upper half.
4. Install the upper half on the lower half with the four fixing screws from the back side.

- **Creating the Alignment Tape without Lid**

1. Remove the four fixing screws on the back of a cassette tape and remove the upper half of the alignment tape as shown in the figure.
2. Remove the lock mechanism lock parts and the springs on the left and right.
3. Remove the cassette lid from the upper half.
4. Install the upper half on the lower half with the four fixing screws from the back side.



5-1. GEAR ASSEMBLY POSITION ADJUSTMENT

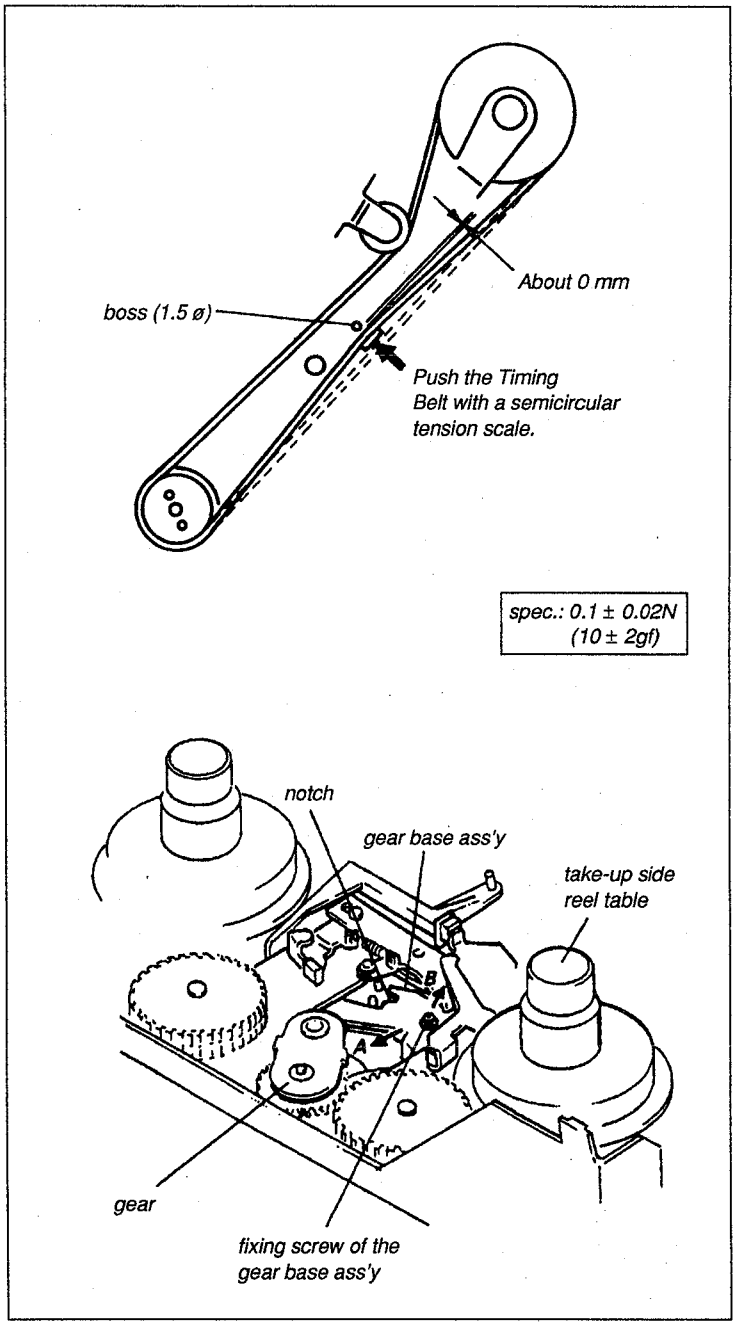
Tool: Tension scale (50 g full scale)
Mode: Any mode is acceptable. (Put the unit into the threading mode.)

Check procedure:

1. Push the Timing Belt in the direction of the arrow with a tension scale as shown in the figure.
2. Check that the reading of the tension scale meets the required specification, when the clearance between the boss and the Timing Belt is about 0 mm.

Adjustment procedure:

1. Loosen the fixing screw of Gear Base Ass'y by one or two turns.
2. Insert a flatblade screwdriver into the notch as shown in the figure, and move the Gear Base Ass'y in the direction as follows:
   - When the reading of the tension scale is smaller than the required specification : in the direction of A
   - When the reading of the tension scale is bigger than the required specification : in the direction of B
3. Tighten the fixing screw of the Gear Base Ass'y.
4. Perform steps 1 and 2 . If the required specification is not satisfied, repeat the adjustment procedures 1 to 4 .



5-2. PRESS LEVER POSITION CHECK

Tool: Blank cassette tape
Wire clearance gauge (0.1mm)

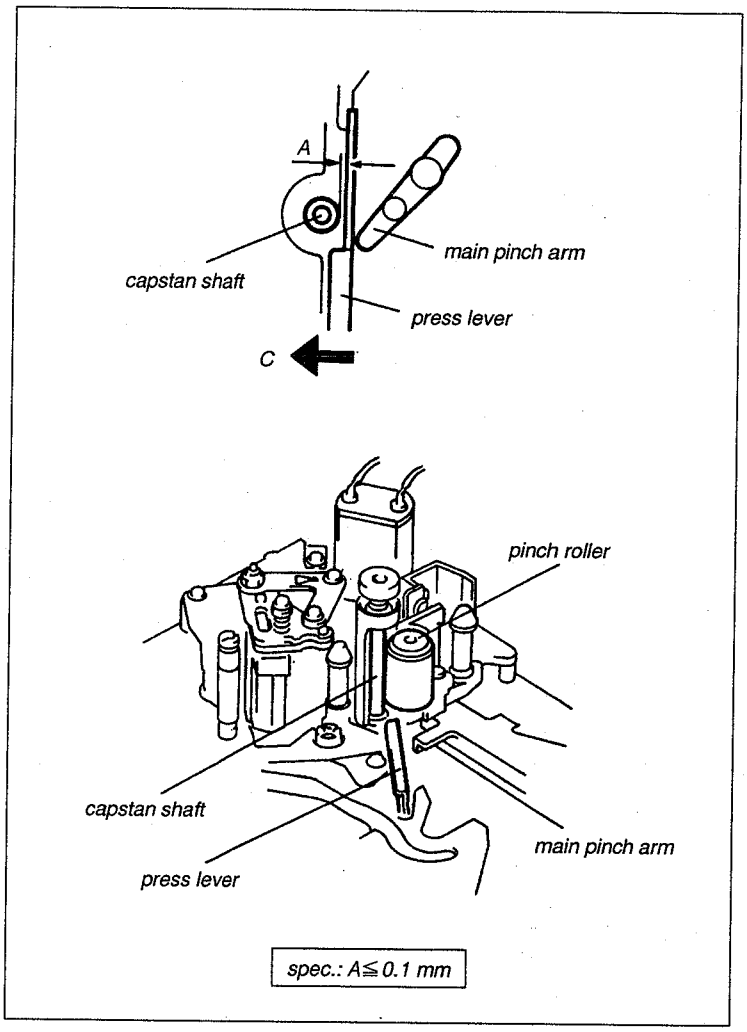
Setting: Remove the Cassette-up Compartment from the mechanical deck.

Mode: Play back the blank cassette tape and turn off the POWER switch.

Check procedure:

1. Insert the blank cassette tape, put the unit into the PLAY mode, then turn off the POWER switch.
2. When Pushing the Press Lever in the direction of the arrow C, check that clearance A between the capstan shaft and the Press Lever meets the required specification.

   • When clearances A do not meet the required specification, perform the Pinch Press Lever Position Adjustment in Section 5-3.



5-3. PINCH PRESS LEVER POSITION ADJUSTMENT

Tool: Blank cassette tape
Wire clearance gauge (0.1, 0.2mm)

Mode: Play back and stop modes with the blank cassette tape.

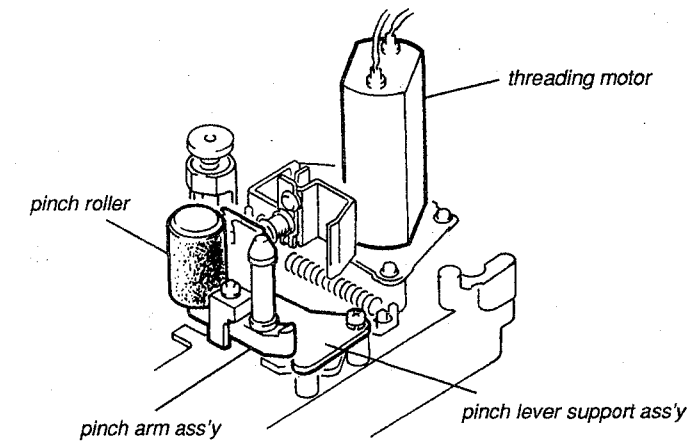
Check procedure:

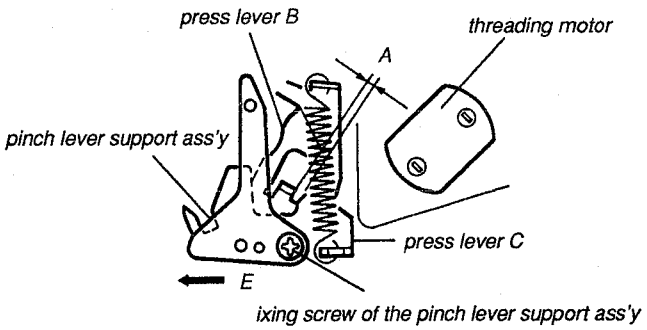
1. Insert the blank cassette tape and put the unit into the PLAY mode.
2. Confirm that clearance A between Press Levers (B) and (C) meets the required specification. (Spec. 1)
3. Put the unit into the STOP mode.
4. Confirm that clearance B between the pinch roller and the capstan shaft meets the required specification. (Spec. 2)

Adjustment procedure:

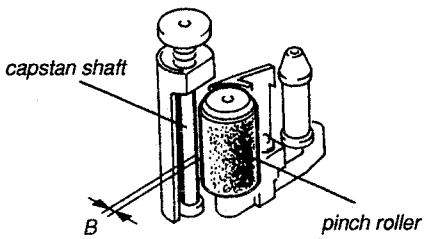
- Adjust so that clearances A and B meet the required specifications.

1. Insert the blank cassette tape and put the unit into the PLAY mode.
2. Loosen the fixing screw of the Pinch Lever Support Ass'y by one turn.
3. Adjust the assembly position so that clearance A between Press Levers (B) and (C) meets the required specification, when pushing the Pinch Lever Support Ass'y in the direction of arrow E.
4. Tighten the fixing screw of the Pinch Lever Support Ass'y.
5. Put the unit into the STOP mode and confirm that clearance B between the pinch roller and the capstan shaft meets the required specification.
   - When the specification is not satisfied, repeat Steps 1 through 5 .





Spec.1 : A ≥ 0.2mm

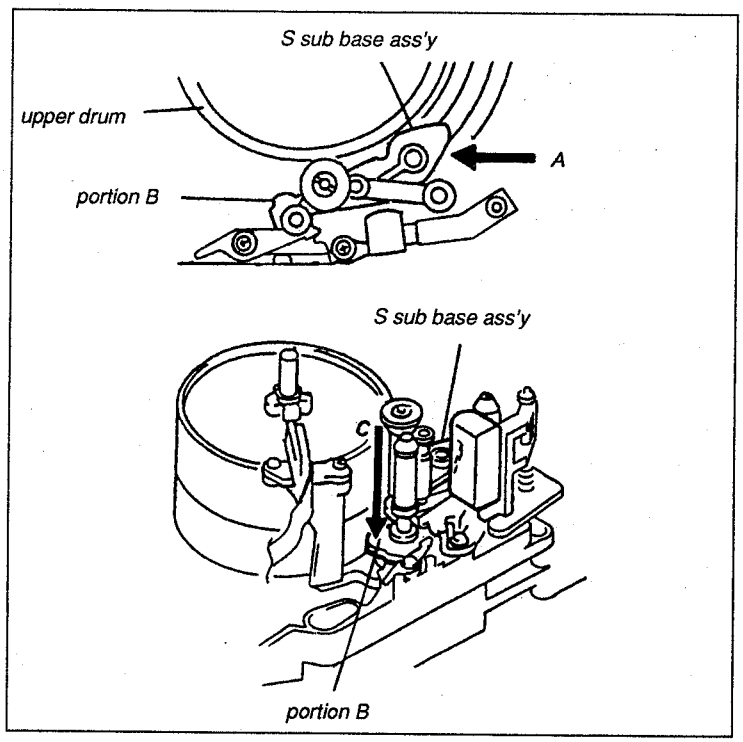


Spec.2 : B ≥ 0.1mm

5-4. THREADING POSITION CHECK (SUPPLY SIDE)

Tool: Blank cassette tape
Mode: Put the unit into the threading completion mode and turn off the POWER switch.
Check procedure:

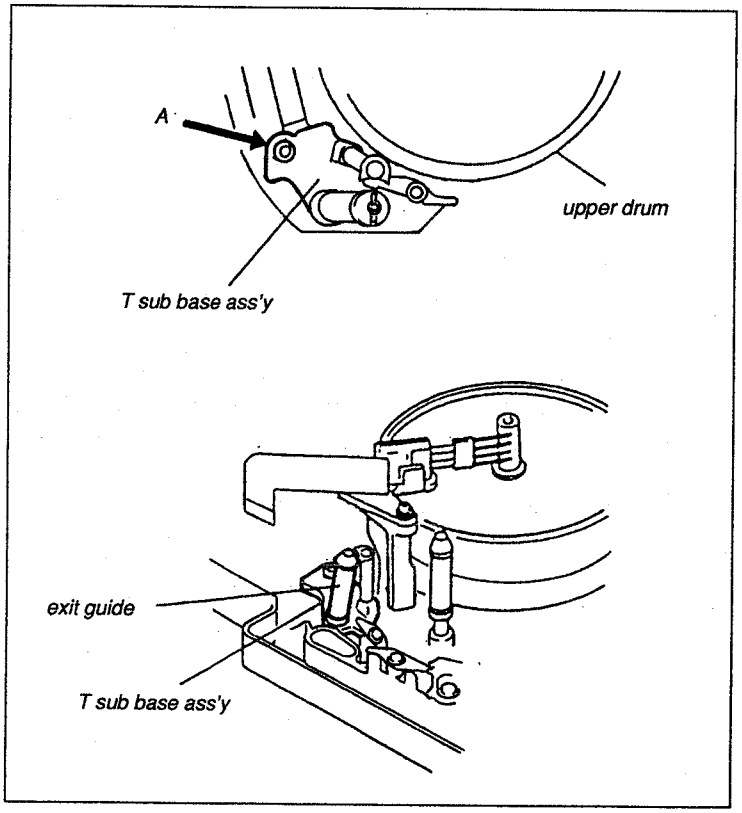
1. Insert the blank cassette tape, put the unit into the threading completion mode, then turn off the POWER switch.
2. When Pushing the S Sub Base Ass'y in the direction of the arrow A with a flatblade precision driver (2mm), confirm that it will not move.
3. When portion B of the S Sub Base Ass'y is pushed in the direction of the arrow C with a flatblade precision driver (2mm), confirm that it will not move in the vertical direction.
4. Confirm that the specifications are satisfied by repeating Steps 1 through 3 two or three times.



5-5. THREADING POSITION CHECK (TAKE-UP SIDE)

Tool: Blank cassette tape
Mode: Put the unit into the threading completion mode and turn off the POWER switch.
Check procedure:

1. Insert the blank cassette tape, u1nit into the threading completion mode, and then turn off the POWER switch.
2. When pushing the T Sub Base Ass'y in the direction of the arrow A with a flatblade precision driver (2mm), confirm that it will not move.
3. Confirm that the required specifications are satisfied by repeating Steps 1 through 3 two or three times.



5-6. IMPEDANCE ROLLER GUIDE II CLEARANCE ADJUSTMENT

Tool: Blank cassette tape
Wire clearance gauge (0.1mm)

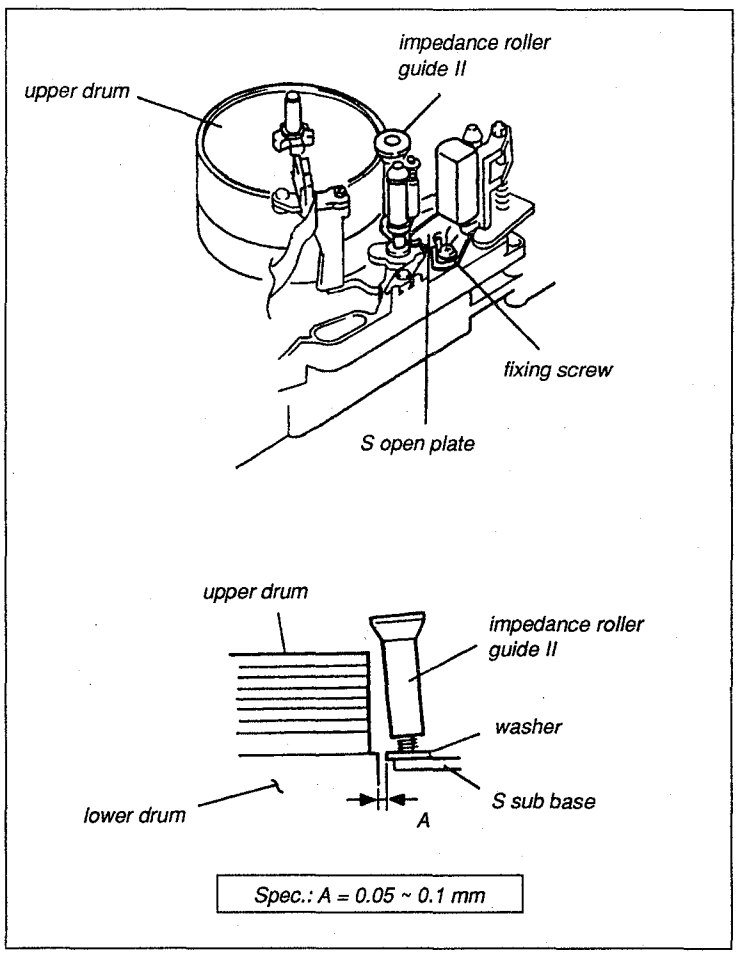
Mode: Put the unit into the threading completion mode and turn off the POWER switch.

Check procedure:

1. Insert the blank cassette tape, put the unit into the threading completion mode, then turn off the POWER switch.
2. Confirm that clearance A between the lower Drum Ass'y and washer meets the required specification.

Adjustment procedure:

1. Loosen the fixing screw of the S Open Plate by one turn and adjust the S Open Plate position so that clearance A meets the required specification.
2. Perform Steps (1) and (2) in the check procedure and confirm that the required specification is satisfied.



5-7. TENSION REGULATOR OPERATING POSITION ADJUSTMENT

Tool: Cassette tape without a lid (BCT-30Ma) (5 minutes run portion from the tape beginnings)

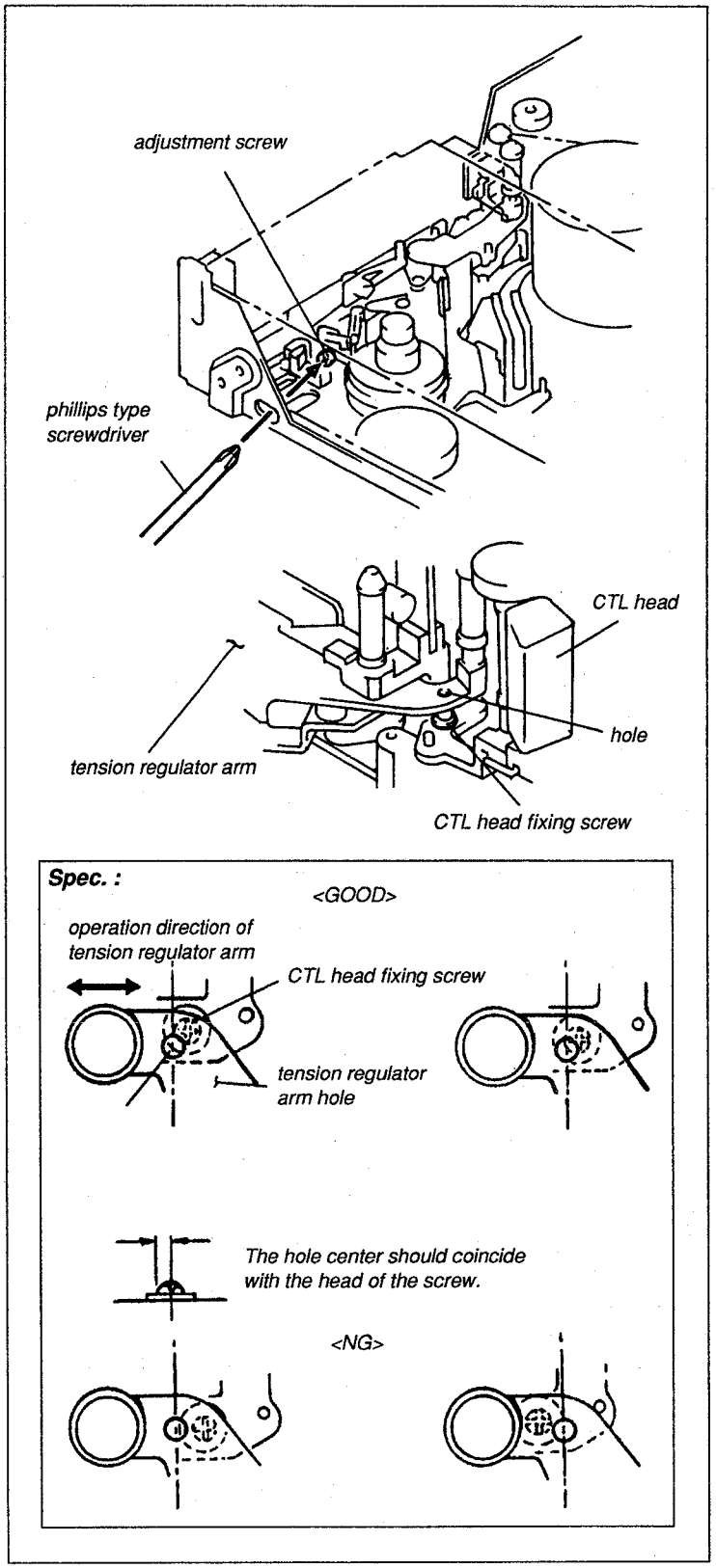
Mode: Play back the cassette tape without a lid.

Check procedure:

1. Confirm that the positional relationship between the Tension Regulator Arm's hole and the CTL Head Fixing Screw meets the required specification.

Adjustment procedure:

1. Insert a phillips type screwdriver through the hole shown in the figure.
2. Turn the adjustment screw so that the required specification is satisfied.



SECTION 6
TAPE PATH ALIGNMENT

(Related Information for tape path adjustment)

1. Maintenance Mode Operation Procedure

Refer to Section 2-24 for how to enter the maintenance menu.
Select the menu No.

No.	Adjustment
604	Tracking control operations
605	SW position adjustment

Procedure for each operation are listed below.

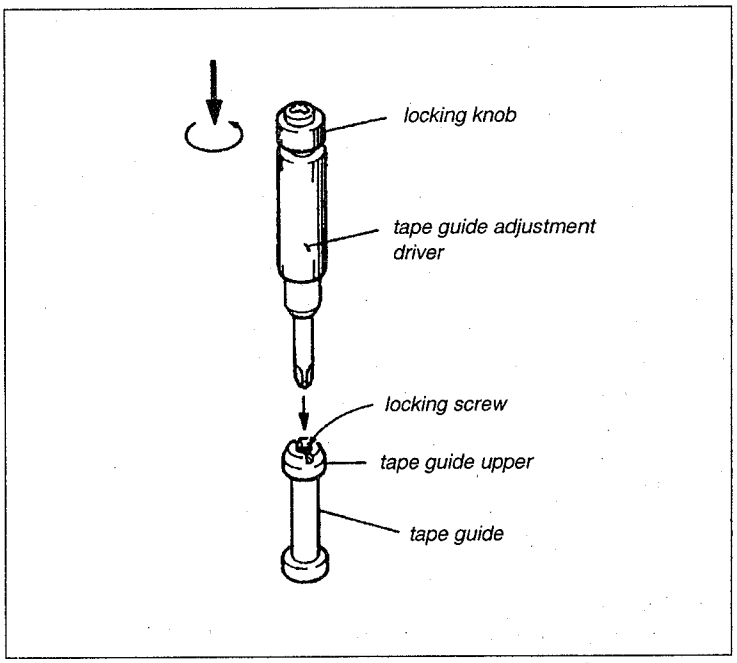
604. Tracking Control Operations Mode
- Tracking can be controlled during PLAY using the FF/REW key.
- Press the PLAY button. Tracking will be reset to the center.
- FF/REW operations can only be performed in the STOP mode.

605. SW Position Adjustment
- The SW positions can be adjusted during PLAY using the FF/REW key.
- Adjustments will be fine when only the FF/REW key is pressed. Adjustments will be rough when the PLAY and FF/REW keys are pressed together.
- The SW positions cannot be moved in modes other than PLAY.
- While this menu is being selected, the H-LOCK of the video will be set into the OFF mode.
- After adjustments, press the MENU SET key. The data will be written in the non-volatile memory and the results of the writing (Yes, No) will be shown on the LCD.
- FF/REW operation can only be performed in the STOP mode.

2. Height Adjustment Procedure of the Tape Guide

When the height adjustment of the tape guide is performed in the Tape Run Alignment, use the tape guide adjustment driver (J-6321-500-A) prepared for the maintenance tool. After the height adjustment of the tape guide is completed, tighten the locking screw of the tape guide upper flange with the torque driver referring to Section 2-4.

1. Put the flatblade of the tape guide adjustment driver in the (-)slot of the tape guide.
2. Push down the locking knob of the adjustment driver and turn it counterclockwise about one turn.
3. Turn the adjustment driver and adjust the height of the tape guide.
4. After the adjustment is completed, tighten the locking screw of the tape guide upper flange referring to Section 2-4.
5. Apply the locking compound to the locking screw. (Never apply the locking compound to the tape running surface of the tape guide, upper and lower flanges.)



6-1. TAPE PATH ADJUSTMENT (PLAY MODE)

Tool: Cassette tape without a lid (BCT-30Ma)
Tape guide adjustment driver

Mode: Play back the cassette tape without a lid.

Check procedure:

1. Insert the cassette tape without a lid (BCT-30Ma) and put the unit into the PLAY mode.
2. Confirm that the tape runs without curl at the flanges of the TG-1, Tension Regulator Guide, TG-4, and Entrance Guide.
3. Confirm that the tape runs without curl at the flanges of the Exit Guide, TG-8, TG-10, and TG-11.

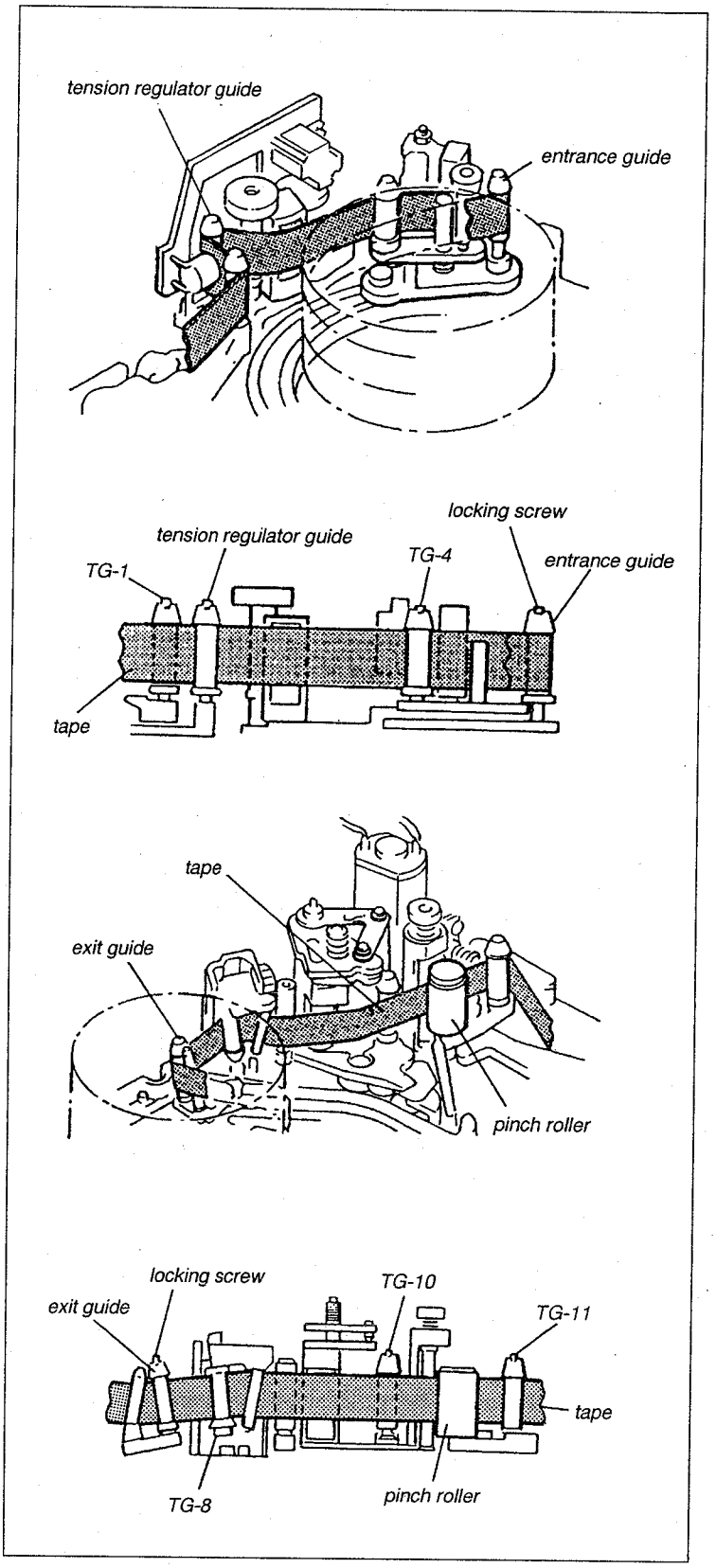
Adjustment procedure:

- **Tape curl at the Entrance Guide or at the lead at the drum entrance side.**

1. Loosen the Upper Flange Locking Screw of the Entrance Guide with tape guide adjustment driver by one or two turns.
2. Turn and adjust the flange of the Entrance Guide so that no tape curl occurs at the Upper Flange of the Entrance Guide and the tape runs along the lead at the drum entrance side.
3. Temporarily tighten the Upper Flange Locking Screw of the Entrance Guide.
4. Check that the tape runs without curl at the flanges of the TG-1 Tension Regulator Guide, TG-4, and Entrance Guide.

- **Tape curl at the Exit Guide or at the lead at the drum exit side.**

5. Loosen the Upper Flange Locking Screw of the Exit Guide with a tape guide adjustment driver by one or two turns.
6. Turn with a tape guide adjustment driver and adjust the flange of the Exit Guide so that no tape curl occurs at the Upper Flange of the Exit Guide and the tape runs along the lead at the drum exit side.
7. Temporarily tighten the Upper Flange Locking Screw of the Exit Guide.
8. Insert the cassette tape without a lid (UVW-30Ma), put the unit into the PLAY mode, and confirm that the tape runs without curl at the flanges of each guide.



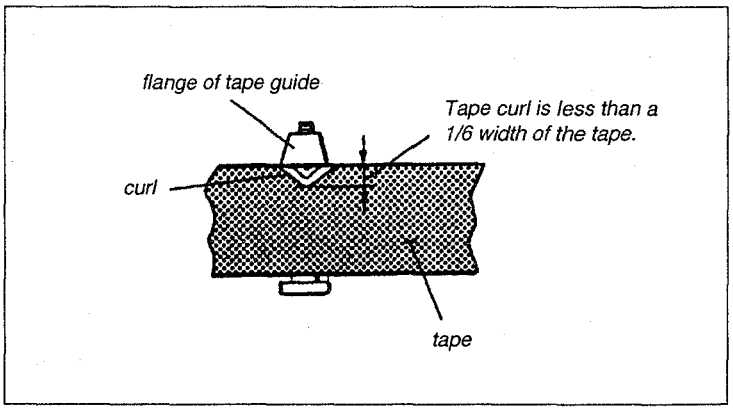
6-2. TAPE PATH CHECK (FF AND REW MODES)

Tool: Cassette tape without a lid (BCT-30Ma) (at the complete tape end)

Mode: Fast-forward and rewind mode with the cassette tape without a lid.

Check procedure:

1. Insert the cassette tape without a lid (BCT-30Ma), put the unit into the FF mode, and confirm that the tape runs without curl at the flanges of each guide. If occurs, curl less than one sixth of the tape width can be acceptable.
2. Put the unit into the REW mode and confirm that the tape runs without curl at the flanges of each guide. If occurs, curl less than one sixth of the tape width can be acceptable.



- When the tape curl does not satisfy the required specification, perform the Tape Path Adjustment (PLAY mode) in Section 6-1 again.

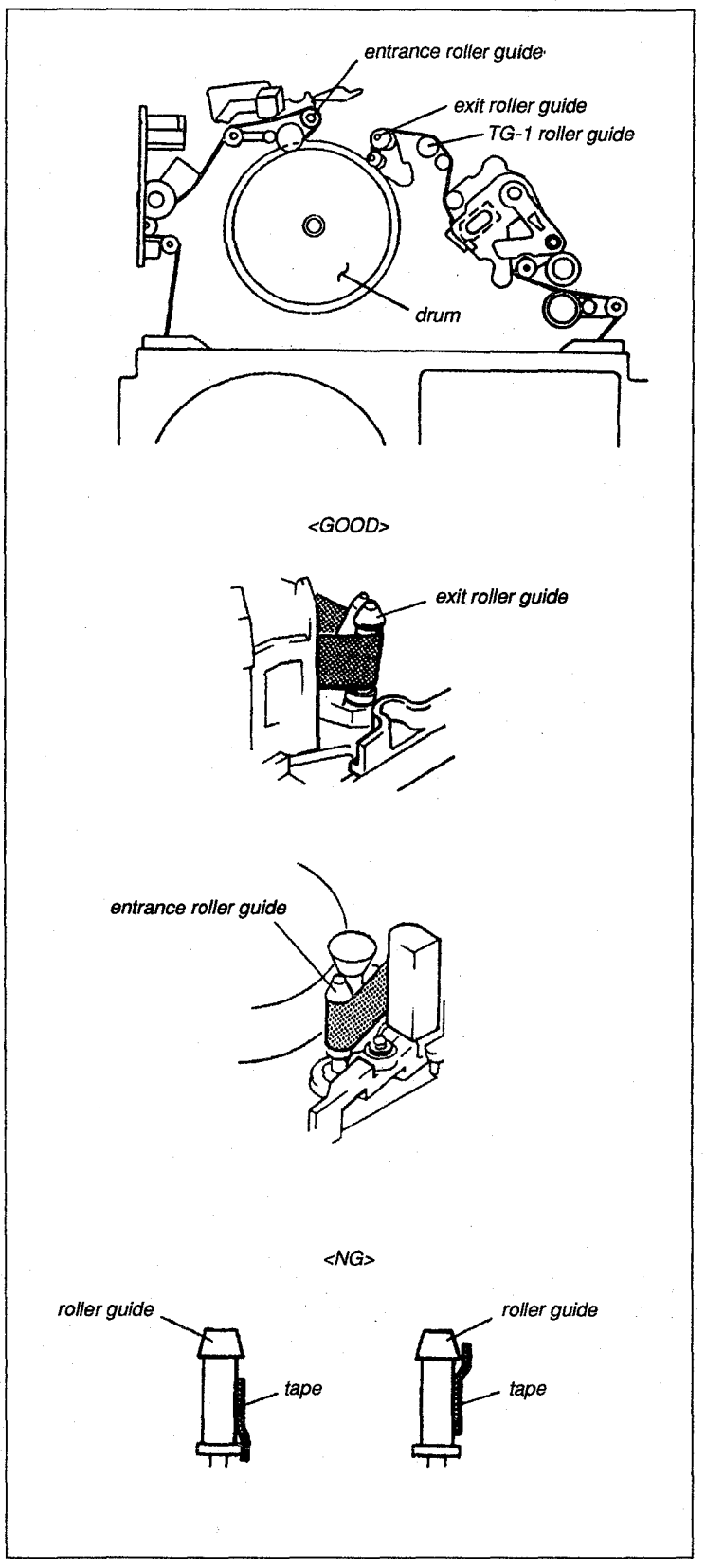
6-3. TAPE THREADING/UNTHREADING CHECK

Tool: Cassette tape without a lid (BCT-30Ma) (at the complete tape beginning)
Cassette tape without a lid (BCT-30Ma) (at the complete tape end)

Mode: Thread the cassette tape without a lid.

Check procedure:

1. Thread the cassette tape without a lid at the complete tape beginning. Confirm that the tape is threaded at the upper and lower flanges of the Entrance and Exit Guide Rollers without curl at this time.
2. Put up the mechanical deck block with the cassette tape in the upper position and drum in the lower position.
3. Check that the threading and unthreading operatious is smooth.
4. Repeat Steps 1 through 3 two or three times and confirm that the required specification is satisfied.
5. Thread the cassette tape without a lid at the complete tape end.
6. Check as in Step 1 .
7. Check as in Steps 1 through 4 .



6-4. PLAY BACK TENSION ADJUSTMENT

Tool: Cassette tape without a lid (BCT-30Ma) (5-minutes run portion from the tape beginning)
Tentelometer: T2-H7-UMC

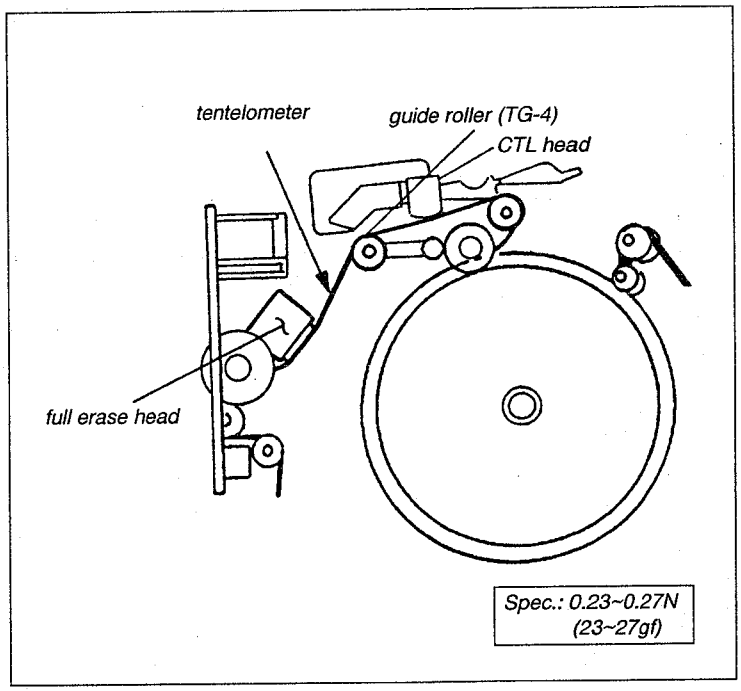
Mode: Play back the cassette tape without a lid

Check procedure:

1. Confirm that the tension regulator operating position meets the required specification in Section 5-7. Tension Regulator Operating Position Adjustment.
2. Insert the Tentelometer between Full Erase Head and Guide Roller (TG-4) as shown in the figure.
3. Confirm that the reading meets the required specification.

Adjustment procedure:

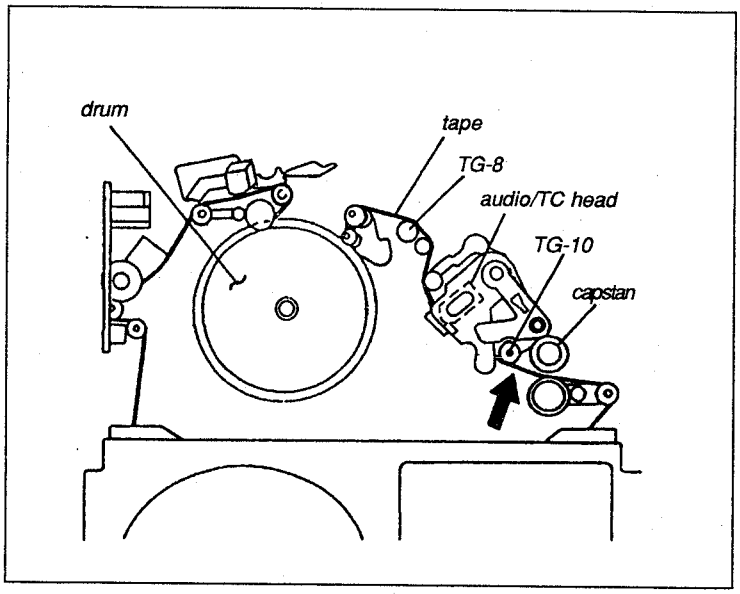
1. Adjust the tension regulator operating position so that the specification is satisfied within the limits required in Section 5-7.
2. When the required specification is not satisfied, replace the Supply Side Reel Table and Tension Regulator Band.
3. Perform the Section 5-7. Tension Regulator Operating Position Adjustment.
4. Perform the check procedure.



6-5. TAPE PATH ADJUSTMENT (AROUND THE PINCH ROLLER)

Tool: Cassette tape without a lid (BCT-30Ma)
Mode: Play back the cassette tape without a lid.
Check procedure:

1. Insert the cassette tape without a lid (BCT-30Ma) and put the unit into the PLAY mode.
2. Put the unit into the PLAY and STOP modes two or three times every two or three seconds and confirm that the tape path of the designated portion (between the A/T Head and capstan shaft) indicated by the arrow satisfies the specifications below.
   - No uneven tape tension occurs at the upper and lower edges of the tape.
   - When the pinch roller is pressed against the capstan shaft, any tape wrinkle occurring on the tape disappears within one second.
   - The tape is not damaged.
3. After unthreading is completed, put the unit into the threading and PLAY modes two or three times.
4. Put the unit into the PLAY mode and confirm that the tape path of the portion indicated by the arrow meets the required specifications in Step 2.

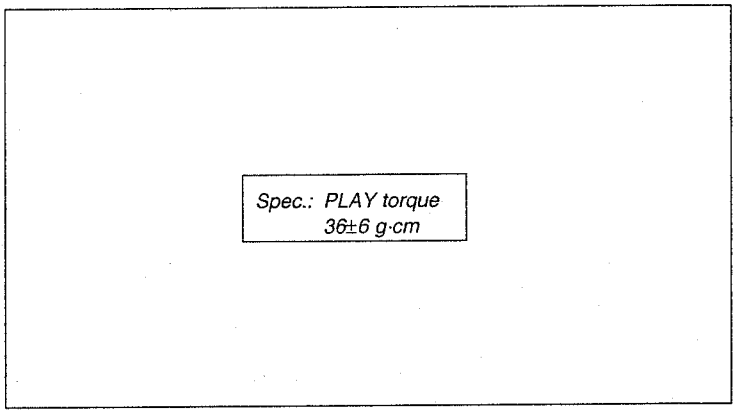


6-6. PLAY TORQUE CHECK

Tool: FWD torque cassette tape, SL-0003C
Mode: PLAY mode with torque cassette
Check procedure:

1. Put the unit into PLAY mode with a torque cassette.
2. After 2 or 3 seconds later, when the pinch roller is pressed against the capstan shaft, confirm that the indication of the meter on the T side of FWD torque cassette tape meets the required specification.

   • When the required specification is not satisfied, replace the T Ider Ass'y.

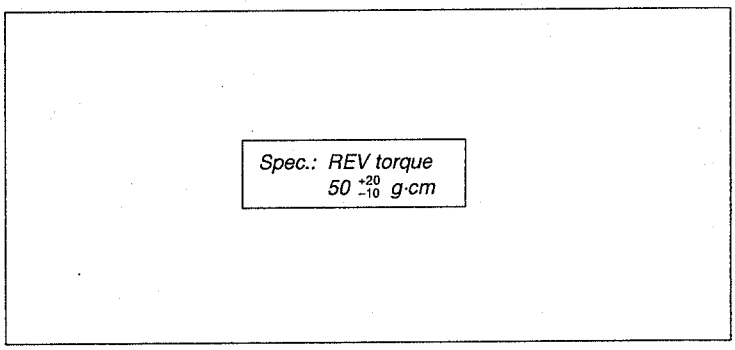


6-7. REV TORQUE CHECK

Tool: FWD torque cassette tape, SL-0003C
Mode: Insert the torque cassette tape and put the unit into the REC PAUSE mode.
Check procedure:

1. Insert the torque cassette and switch the mode in the following order.
   REC → PAUSE
2. When the mode is changing from REC mode to PAUSE mode, the tape gets into REV mode. Confirm that the meter indication meet the specification.

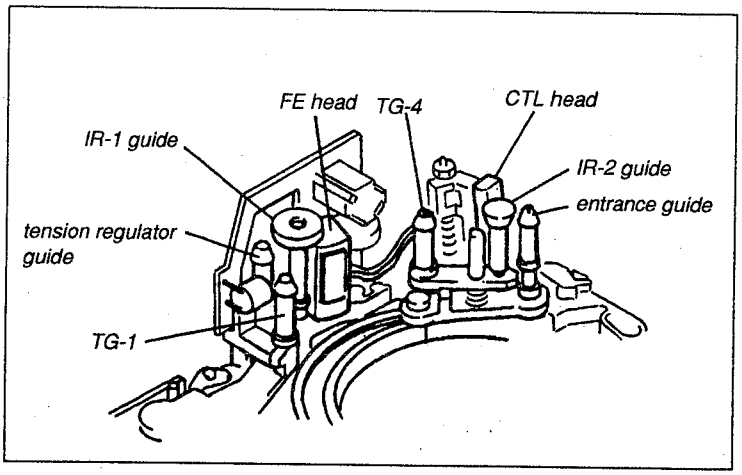
• When the required specification is not satisfied, replace the S Idler Ass'y.

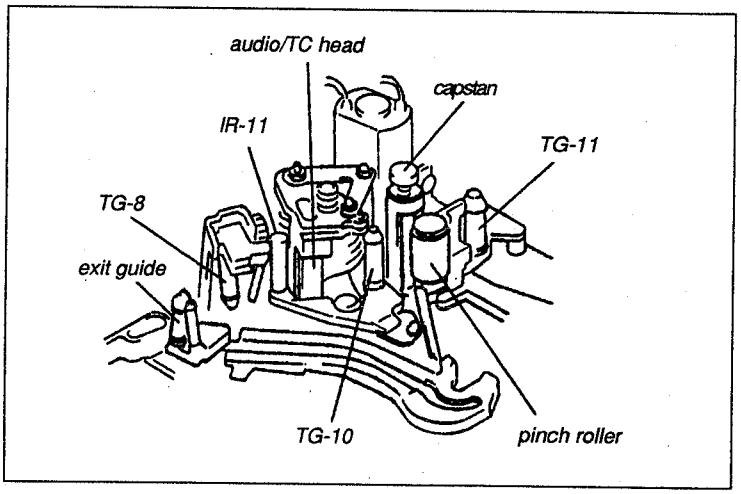


6-8. TRACKING ADJUSTMENT

- The tape guides and heads at the drum entrance side in this adjustment are illustrated.
- The tape guides and heads at the drum exit side in this adjustment are illustrated.
- Before performing the tracking adjustment, clean the tape guide, stationary head, drum, capstan shaft, and pinch roller described above with a cloth moistened with cleaning fluid.
- The drum mounts four video heads for Y and C heads, respectively. The video tracking adjustment is made with channel 1 of the Y head as reference.
- After the tracking adjustment is completed, perform the adjustment as follows:

Sec 6-1	Tape Path Adjustment (Play Mode)
Sec 6-2	Tape Path Check (FF and REW Modes)
Sec 6-9	CTL Head Height Adjustment
Sec 6-10	CTL Head Position Adjustment
Sec 6-12	Audio/Timecode Head Position Adjustment
Sec 6-13	Audio Timecode Head Height Adjustment
Sec 6-12	Audio/Timecode Head Position Adjustment (Check)
Sec 6-14	Audio Timecode Head Phase Adjustment





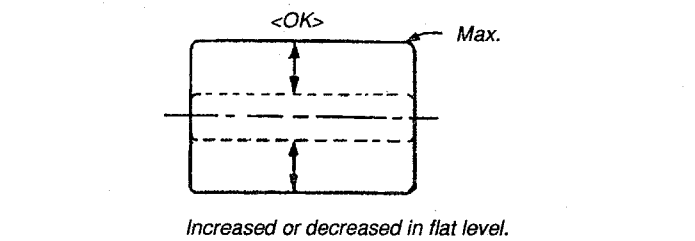
Tool: Alignment tape without a lid (CR2-1B/CR2-1B PS)
Dental mirror
Oscilloscope
Tape guide adjustment driver

Setting: Select MENU No. 604 from the maintenance menu.
(Refer to Section 2-24)

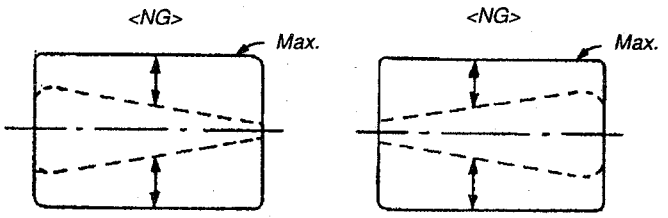
Mode: Play back the alignment tape.

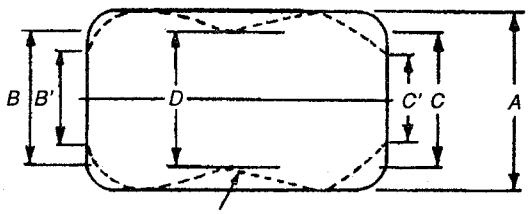
Check procedure:

1. Connect the oscilloscope as follows:
   CH-1: TP700/VO-46 Board
   (waveforms of Y head in CH1 to CH4)
   CH-2: TP702/VO-46 Board
   (Stair Pulse)
   TRIG: TP702/VO-46 Board
   (Stair Pulse)
2. Insert the alignment tape CR2-1B/1BPS and put the unit into the PLAY mode.
3. Confirm that the waveforms of channels 1 through 4 of the Y head meet the required specificasions of the Steps 4 and 5 .
4. Check that the RF envelope waveform increases and decreases while remaining flat when the FF or REW button is pressed.
5. Check that the RF envelope waveform head-to-tape contact and fluctuation are within the specification at the maximum amplitude.
6. Connect the oscilloscope as follows:
   CH-1: TP750/VO-46 Board
   (waveforms of CH1 through CH4 of C head)
   CH-2: TP702/VO-46 Board
   (Stair pulse)
   TRIG: TP702/VO-46 Board
   (Stair pulse)
7. Confirm that the waveforms of channels 1 through 4 of the C head meet the required specifications of the Steps 4 and 5 .



Increased or decreased in flat level.





RF output level deterioration due to fluctuation

$\frac{B}{A} \geqq 0.8$

$\frac{C}{A} \geqq 0.8$

$\frac{D}{A} \geqq 0.9$

$\frac{B'}{B} \geqq 0.9$

$\frac{C'}{C} \geqq 0.9$

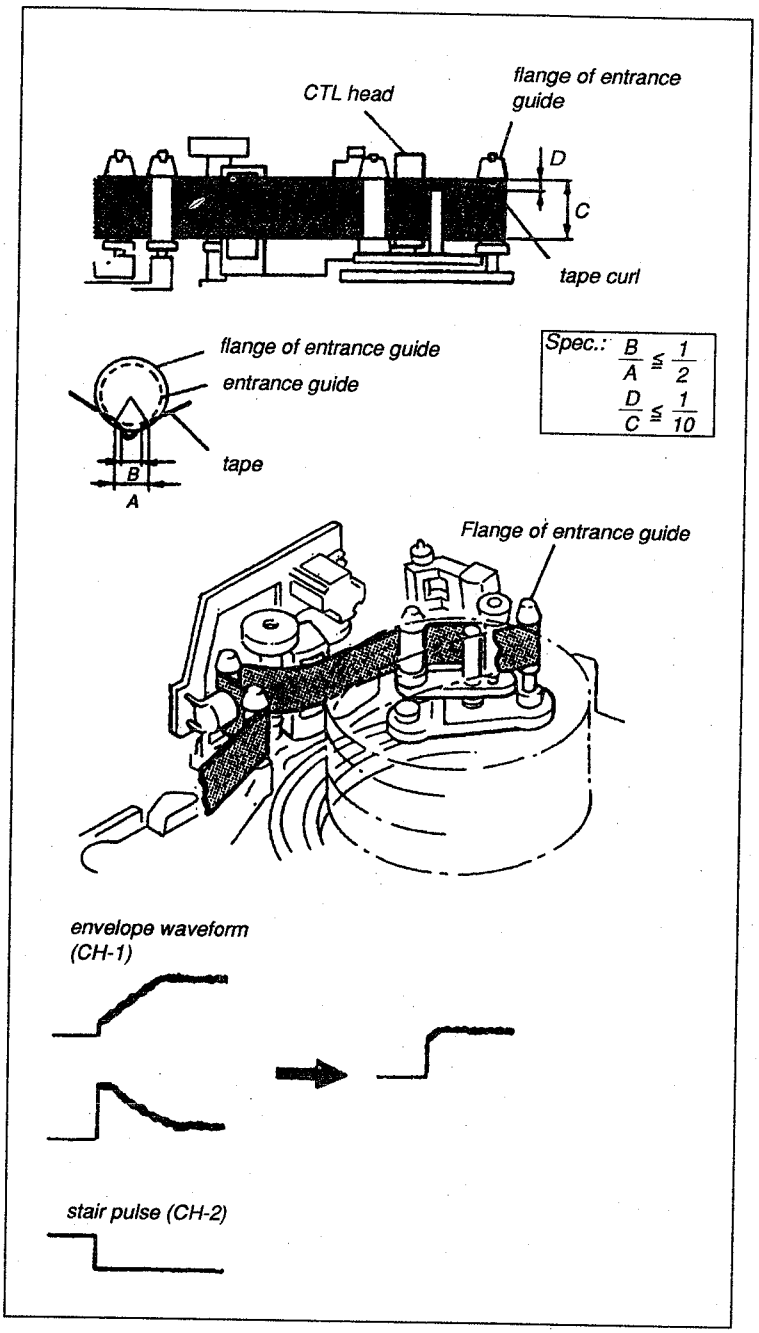
A: Maximum output level
D: Minimum output level due to fluctuation in the center portion
C, B: Maximum output level at entrance and exit side
C', B': Minimum output level due to fluctuation at entrance and exit side

Adjustment procedure:

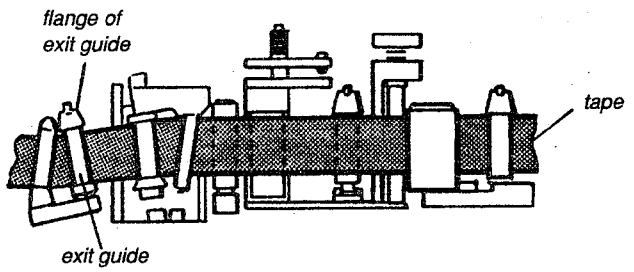
1. Connect the oscilloscope as follows:
   CH-1: TP700/VO-46 Board
   CH-2: TP702/VO-46 Board
   TRIG: TP702/VO-46 Board
2. Insert the alignment tape CR2-1B/CR2-1B PS and put the unit into the PLAY mode.
3. Press the FF or REW button and adjust so that the maximum RF envelope waveform output is around 70% to 80%.

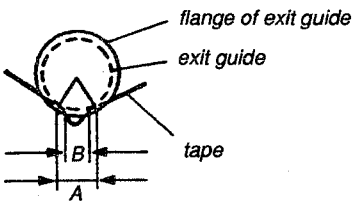
- To make a tracking adjustment at entrance side, perform Steps 4 through 8 plus Steps 14 and after. To make a tracking adjustment at exit side, perform Steps 9 through 13 plus Steps 14 and after.

4. Loosen the Upper Flange Locking Screw of the Entrance Guide by one or two turns with the tape guide adjustment driver.
5. Turn the upper flange of the Entrance Guide with the tape guide adjustment driver and adjust so that the required specifications below are satisfied.
   (i) The RF envelope waveform at entrance side is flat.
   (ii) No tape curl occurs at the upper flange of the Entrance Guide.
   (iii) The tape touches the lead at the drum entrance side.
6. Tighten the Upper Flange Locking Screw of the Entrance Guide with the tape guide adjustment driver.
7. Put the unit into the EJECT and PLAY modes two or three times and confirm that the required specifications in Step 5 are satisfied.

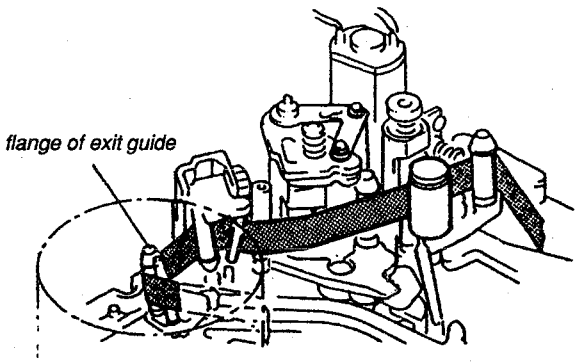


8. When raised the mechanical deck with the cassette tape in the upper position and the drum in the lower position, check that the RF envelope waveform at the entrance side meets the required specification.
9. Loosen the Upper Flange Locking Screw of the Exit Guide by one or two turns with a tape guide adjustment driver.
10. Turn the upper flange of the Exit Guide with the tape guide adjustment tool and adjust so that the required specifications below are satisfied.
    (i) The RF envelope waveform at exit side make flat.
    (ii) No tape curl occurs at the upper flange of the Exit Guide.
    (iii) The tape touches the lead at the drum exit side.
11. Tighten the Upper Flange Locking Screw of the Exit Guide with the tape guide adjustment driver.
12. Repeat the EJECT and PLAY modes two or three times and confirm that Step 10 is satisfied.
13. When raised the mechanical deck with the cassette tape in the upper position and the drum in the lower position, confirm that the RF envelope waveform at the exit side meets the required specification.
14. Connect the oscilloscope as follows:
    CH-1: TP750/VO-46 Board
    CH-2: TP702/VO-46 Board
    TRIG: TP702/VO-46 Board
15. Check that the RF envelope waveform increases and decreases while remaining flat when the FF or REW button is pressed.
16. Perform the adjustments as follows:
    Sec 6-1 Tape Path Adjustment (Play Mode)
    Sec 6-2 Tape Path Check (FF and REW Mode)

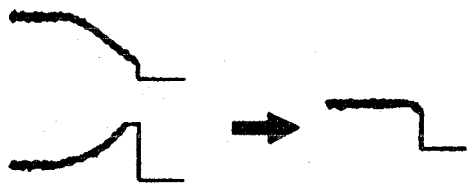




Spec.:
$\frac{B}{A} \leqq \frac{1}{2}$



envelope waveform (CH-1)



stair pulse (CH-2)

6-9. CTL HEAD HEIGHT ADJUSTMENT

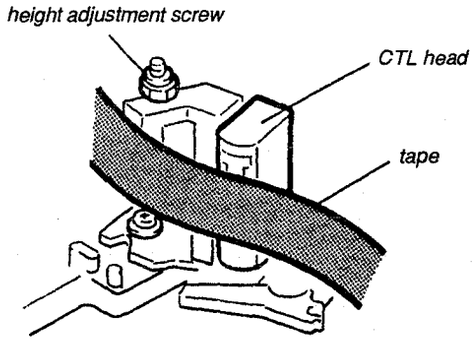
Tool: Alignment tape without a lid (CR8-1A/CR8-1B PS) Oscilloscope

Setting: Connect the oscilloscope as follows:
CH-1:TP2/FE-18 Board

Mode: Play back the alignment tape.

Adjustment procedure:

1. Play back a 1 kHz audio signal which is recorded on the CTL track of the alignment tape.
2. Turn the height adjustment screw so that the output waveform is maximized.



6-10. CTL HEAD POSITION ADJUSTMENT

- The drum mounts four video heads for Y and C heads, respectively. The CTL head position adjustment is made with channel 1 of the Y head as reference.

Tool: Alignment tape without a lid (CR2-1B/CR2-1B PS)
Oscilloscope
Screwdriver –3mm

Setting: 1. Select MENU No. 604 from the maintenance menu.
(Refer to Section 2-24)
2. Connect the oscilloscope as follows:
CH-1: TP700/VO-46 Board
CH-2: TP702/VO-46 Board
TRIG: TP702/VO-46 Board

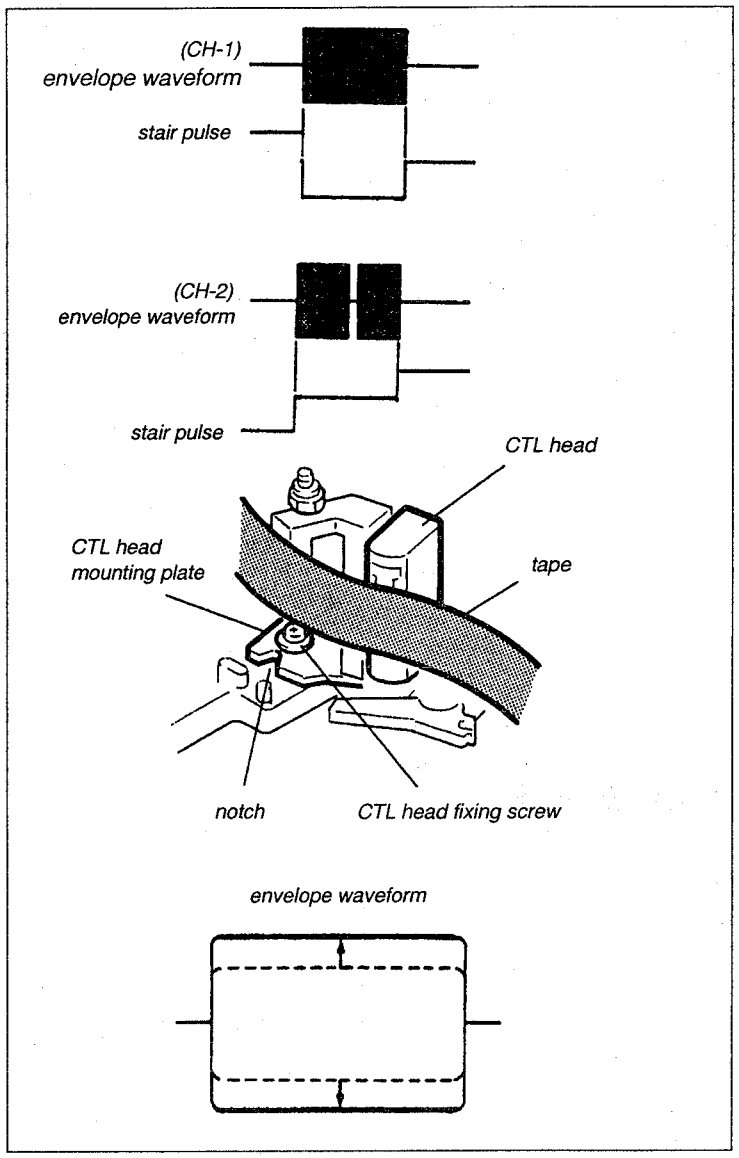
Mode: Play back the alignment tape.

Check procedure:

1. Insert the alignment tape CR2-1B/CR2-1B PS and put the unit into the PLAY mode.
2. Check that the RF envelope waveform decreases when the FF or REW button is pressed. (Adjust if it increases even if it is slight.)
3. Confirm that the relationship between the switching pulse and RF envelope waveform meets the required specification.

Adjustment procedure:

1. Press the PLAY button and adjust the tracking to the center.
2. Loosen the fixing screw of CTL head by 1/2 turn.
3. Insert a flatblade 3mm screwdriver into the notch of the CTL Head Mounting Bracket and adjust the CTL head position so that the RF envelope waveform is maximum.
4. Tighten the CTL head fixing screw.
5. Check according to the check procedure.



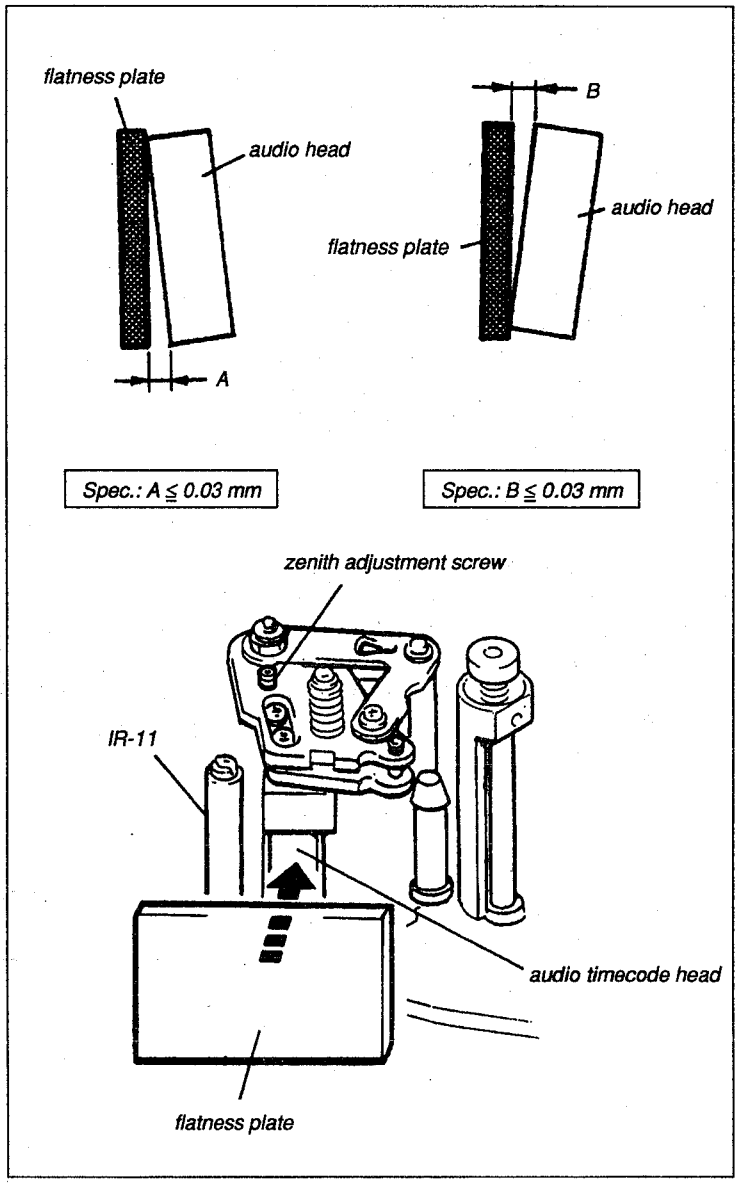
6-11. AUDIO TIMECODE HEAD ZENITH ADJUSTMENT

Tool: Flatness plate
Mode: EJECT mode
Check procedure:

1. Put the flatness plate onto the IR-11 guide and audio head.
2. When the flatness plate is pressed onto the IR-11 guide, confirm that the clearance between the flatness plate and audio head meets the required specification.

Adjustment procedure:

1. Adjust the Zenith Adjustment Screw so that the specification is satisfied.
2. Adjust as follows:
   - Sec 6-14 Audio Timecode Head Phase Adjustment
   - Sec 6-12 Audio Timecode Head Position Adjustment
   - Sec 6-13 Audio Timecode Head Height Adjustment
   - Sec 6-12 Audio Timecode Head Position Adjustment



6-12. AUDIO/TIMECODE HEAD POSITION ADJUSTMENT

Tool: Alignment tape without a lid
(CR2-1B/CR2-1B PS)
Screwdriver –3 mm

Setting: Connect the oscilloscope as follows:
CH-1: TP2/FE-18 Board (CTL waveform)
CH-2: TP1/MB-552 Board (TC waveform)
TRIG: TP405/SS-57 Board (1/2 VD)

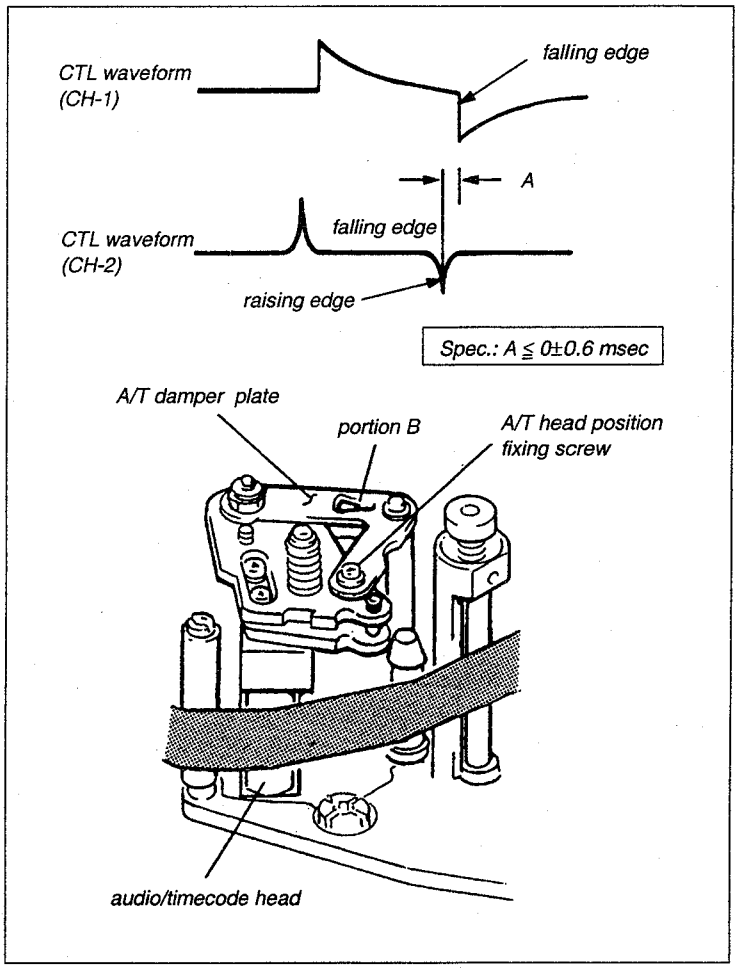
Mode: Play back the alignment tape.

Check procedure:

1. Insert the alignment tape CR2-1B/CR2-1B PS and put the unit into the PLAY mode.
2. Confirm that the relationship between the phase at the falling edge of the CTL waveform and that at the falling edge of the TC waveform meets the required specification.

Adjustment procedure:

1. Loosen the A/T Head Position Fixing Screw by one or two turns.
2. Insert a flatblade 3mm screwdriver into portion B of the A/T Damper Plate and adjust the Audio/ Timecode head position so that the required specification is satisfied.
3. Tighten the A/T Head Position Fixing Screw and recheck.



6-13. AUDIO TIMECODE HEAD HEIGHT ADJUSTMENT

Tool: Alignment tape without a lid (CR8-1A/CR8-1B PS)

Setting: (1) Connect the oscilloscope as follows:
CH-1: TP303/AU-185 Board
CH-2: TP403/AU-185 Board

Mode: Play back the alignment tape.

Check procedure:

1. Play back an 1 kHz/0 dB audio signal on the alignment tape.
2. When pushing up and pressing down the tape of the illustrated portion between the audio/timecode head and IR-11 Guide, confirm that the output waveform is decreased without increasing. (Perform the adjustment when the output waveform is increased.)

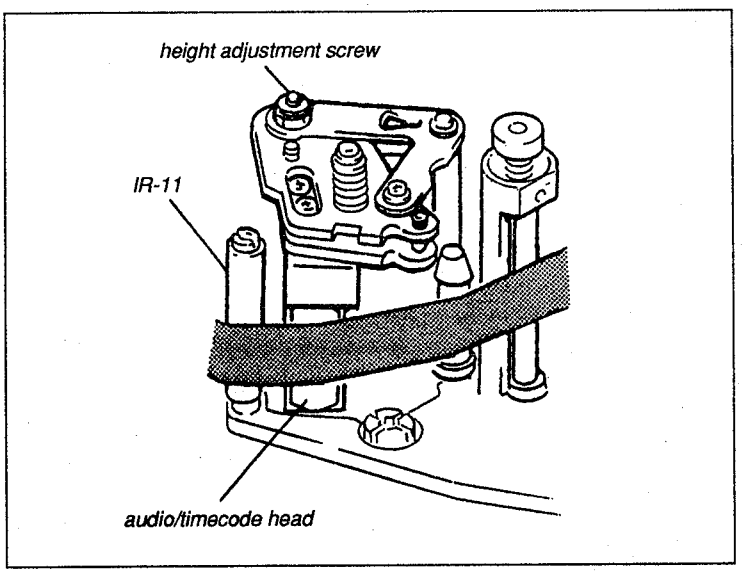
Adjustment procedure:

- When the output waveform is increased by pushing up the tape.

1. Turn the Height Adjustment Screw clockwise so that the output waveform is maximum.

- When the output waveform is increased by pressing down the tape.

2. Turn the Height Adjustment Screw counterclockwise so that the output waveform is maximum.



6-14. AUDIO TIMECODE HEAD PHASE ADJUSTMENT

Tool: Alignment tape without a lid (CR8-1A/CR8-1B PS)

Setting:

1. Connect the horizontal and vertical terminals of the oscilloscope to TP303 and TP403 on the AU-185 Board.
2. Play back an 1 kHz audio signal on the alignment tape.
3. Adjust the oscilloscope for horizontal and vertical amplitudes to 6cm of a lissajous waveform.

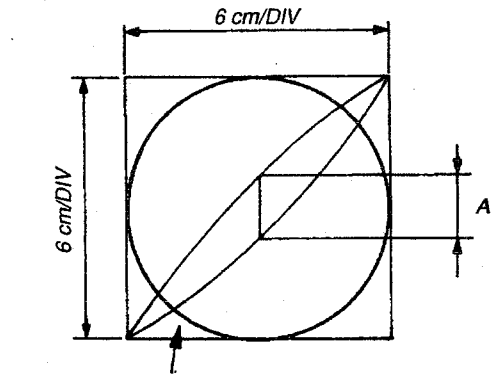
Mode: Play back the alignment tape.

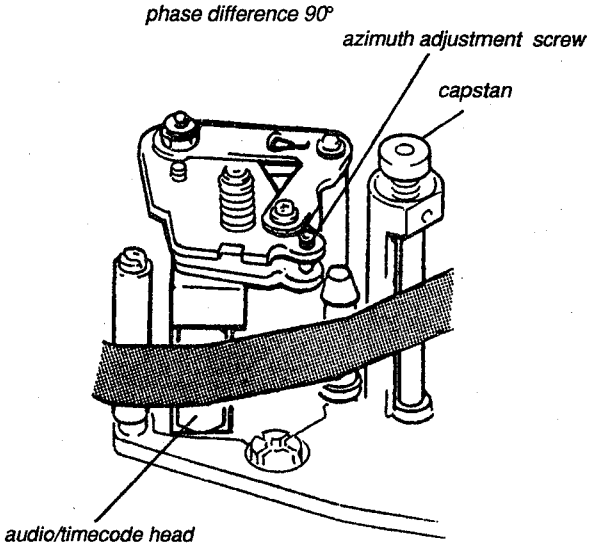
Check procedure:

1. Play back an 1 kHz audio signal on the alignment tape.
2. Confirm that the phase difference meets the required specification.
3. Play back a 10 kHz/-10 dB audio signal on the alignment tape.
4. Confirm that the phase difference meets the required specification.

Adjustment procedure:

1. Play back 1 kHz and 10 kHz audio signals on the alignment tape.
2. Adjust the Azimuth Adjustment Screw so that both specifications are satisfied.





Spec.: *1 kHz: A ≦ 0.52 cm (5°)*
10 kHz: A ≦ 0.52 cm (5°)

6-15. PB SWITCHING POSITION ADJUSTMENT

Tool: Alignment tape, CR2-1B/CR2-1B PS

Setting:

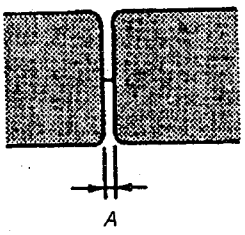
1. Setting:Select MENU No. 605 from the maintenance menu.
   (Refer to Section 2-24.)
2. Connect the oscilloscope as follows:
   CH-1: TP700/VO-46 board
   TRIG: TP405/SS-57 board

Mode: Play back the alignment tape.

Adjustment procedure:

1. Insert the alignment tape CR2-1B/CR2-1B PS and put the unit into the PLAY mode.
2. Press the FF or REW button and adjust so that the CH-1 waveform satisfies the specification.
   (At MENU No. 605, the switching position can be adjusted finely using the FF or REW button. It can be adjusted roughly by pressing the PLAY button together with the FF or REW button.)
3. Press the MENU SET button and check that the writing result displayed on the LCD is "YES".
4. If "NO" is displayed, set a maintenance menu other than MENU No. 605 and select MENU No. 605 again.
   Press the MENU SET button.

RF waveform
(CH-1)



Spec.: A ≦ 10 µsec

6-16. BRUSH ADJUSTMENT

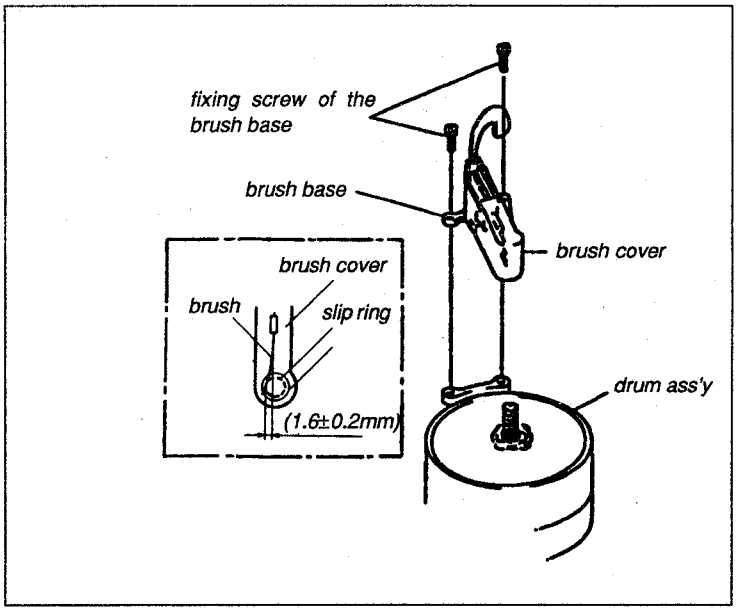
6-16-1. Brush Position Adjustment

Mode: EJECT
Check procedure:
Confirm that the slip ring and the brush are in the following status when viewed from top.

1. Make sure that the brush is positioned as shown in the illustration with reference to the slip ring.
2. Make sure that the slip ring is placed at the center of moldline on the brush cover.

Adjustment procedure:

1. Loosen the two fixing screws of the Brush Base, and adjust the position of the brush base so that the specification is satisfied.



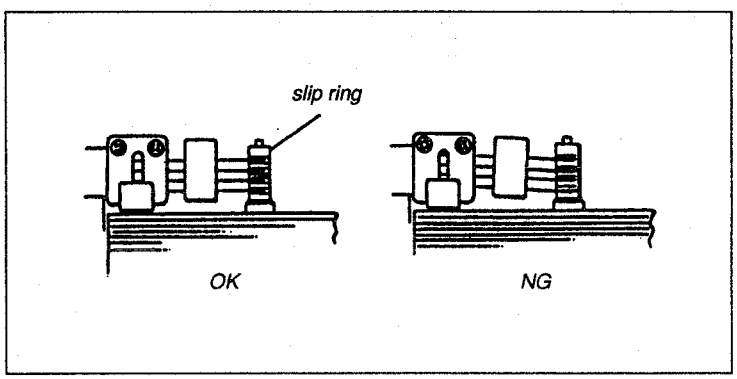
6-16-2. Brush Height Adjustment

Mode: EJECT
Check procedure:

1. Confirm that the Brush is parallel to the Slip Ring Groove.

Adjustment procedure:

1. Remove the Brush Base from the unit as described in Section 6-16-1. Brush Position Adjustment.
2. Remove the Brush Cover from the Brush Base.
3. Install the Brush Base on the unit, and loosen the two fixing screws of the Brush Base and adjust so that the specification is satisfied.
4. After adjustment, install the Brush Cover and adjust the brush position as described in Section 6-16-1.



SECTION 7
ELECTRICAL ALIGNMENT OVERVIEW

7-1. ADJUSTMENT PART

AU-185/185P Board

CV131 CH1 BIAS LEVEL 10-7
CV231 CH2 BIAS LEVEL 10-7
LV111 CH1 REC EQ (HIGH) 10-8
LV131 CH1 BIAS TRAP 10-6
LV211 CH2 REC EQ (HIGH) 10-8
LV231 CH2 BIAS TRAP 10-6
RV111 CH1 REC LEVEL 10-7
RV112 CH1 REC EQ (MID) 10-8
RV113 CH1 REC PHASE 10-9
RV211 CH2 REC LEVEL 10-7
RV212 CH2 REC EQ (MID) 10-8
RV302 CH1 PB EQ 10-5
RV303 CH1 PB LEVEL 10-6
RV402 CH2 PB EQ 10-5
RV403 CH2 PB LEVEL 10-6
T1 BIAS TRAP 10-6

TC-86B/86C Board

CV1 CLOCK FREQUENCY 8-1
RV102 CH-1 PRESET LEVEL 10-5
RV202 CH-2 PRESET LEVEL 10-5
RV302 CH-1 METER LEVEL 10-5
RV402 CH-2 METER LEVEL 10-5
RV701 LIMITER LEVEL 10-5

VO-46B/46C Board

CV200 Y RF REC CURRENT FREQ CH-1 11-10
CV201 Y RF REC CURRENT FREQ CH-2 11-10
CV202 Y RF REC CURRENT FREQ CH-3 11-10
CV203 Y RF REC CURRENT FREQ CH-4 11-10
CV600 C RF REC CURRENT FREQ CH-1 11-22
CV601 C RF REC CURRENT FREQ CH-2 11-22
CV602 C RF REC CURRENT FREQ CH-3 11-22
CV603 C RF REC CURRENT FREQ CH-4 11-22
LV400 PLL VCO ERROR 11-5
RV100 Y INPUT LEVEL 11-5
RV102 Y NON LINEAR EMPHASIS LEVEL 11-7
RV103 Y DEVIATION 11-8
RV104 Y CARRIER 11-8
RV105 Y RF REC HF LEVEL 11-7
RV200 Y RF REC CURRENT LEVEL CH-1 11-10
RV201 Y RF REC CURRENT LEVEL CH-2 11-10
RV202 Y RF REC CURRENT LEVEL CH-3 11-10
RV203 Y RF REC CURRENT LEVEL CH-4 11-10
RV251 Y SLEW RATE LIMITER FREQUENCY RESPONSE 11-7
RV300 C/C DELAY TENTATIVE 11-17
RV301 R-Y A/D INPUT LEVEL 11-16
RV302 R-Y A/D CLAMP VOLTAGE 11-16
RV351 B-Y A/D INPUT LEVEL 11-16
RV352 B-Y A/D CLAMP VOLTAGE 11-16
RV401 Y REF SYNC POSITION 11-6
RV450 C REF SYNC POSITION TENTATIVE 11-18
RV500 CTDM LEVEL 11-17
RV502 C NON LINEAR PRE-EMPHASIS MIX LEVEL 11-19
RV505 C REC HF LEVEL 11-19
RV506 C DEVIATION 11-20
RV507 C CARRIER 11-20
RV600 C RF REC CURRENT LEVEL CH-1 11-22
RV601 C RF REC CURRENT LEVEL CH-2 11-22
RV602 C RF REC CURRENT LEVEL CH-3 11-22
RV603 C RF REC CURRENT LEVEL CH-4 11-22
RV700 Y RF LEVEL CH-1 11-28
RV701 Y RF LEVEL CH-2 11-28
RV702 Y RF LEVEL CH-3 11-28
RV703 Y RF LEVEL CH-4 11-28
RV750 C RF LEVEL CH-1 11-28
RV751 C RF LEVEL CH-2 11-28
RV752 C RF LEVEL CH-3 11-28
RV753 C RF LEVEL CH-4 11-28
RV850 RF ALARM 11-28

7-2. REQUIRED EQUIPMENT

Measure Equipments

Equipment	Equivalent	Note
Oscilloscope	Tektronix 2445B	more than 200 MHz
Waveform Vector	Tektronix 1750 (NTSC)/1751 (PAL)/ 1780R (NTSC)/1781R (PAL)	Setup 0
Component Signal Generator	Tektronix TSG-300 (Betacam SP Spec.)	for Betacam SP
Waveform Monitor	Tektronix WFM300/WFM300A/ 1780R(NTSC)/1781R(PAL)	Component
Spectrum Analyzer	Advantest R4131 B/D	
Sweep Generator	Shibasoku VS-12CX	
Frequency Counter	Advantest TR5821	
Audio Signal Generator	HP 8904	Sine wave 600 kHz
Audio Distortion Analyzer	HP 339A	10 Hz through 110 kHz, 1 mV through 300 V
Audio Level Meter	HP 3400A	
Digital Voltmeter	Advantest TR6845	

Tool

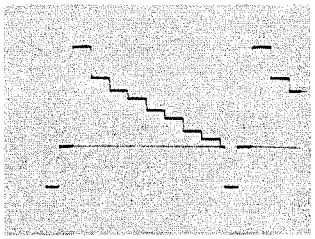
Tool	Equivalent	Note
Deviation Checker	EW-579, SONY Part No. J-6335-790-A (NTSC) EW-580, SONY Part No. J-6335-800-A (PAL)	Tool for SONY Batacam
DC Power Supply	SONY CMA-8/8A or AC-500/550 (NTSC) SONY CMA-8CE/8ACE or AC-500CE/ 550CE (PAL)	
Blank Tape	SONY BCT-20MA	Stand and Products
Alignment Tape (Video)	CR5-1B, SONY Part No. 8-960-096-41 (NTSC) CR5-1B PS, SONY Part No. 8-960-096-91 (PAL)	Refer to Section 11 Video Alignment
Alignment Tape (Audio)	CR8-1A, SONY Part No. 8-960-997-45 (NTSC) CR8-1B PS, SONY Part No. 8-960-096-86 (PAL)	Refer to Section 10 Audio Alignment
Standard Videocassette Player	SONY PVW-2600 (NTSC)/2600P (PAL)	
Camera Tool	EW-783, SONY Part No.J-6337-830-A	Refer to Section 11 Video Alignment
Recording Current Adjustment Tool	EW-571, SONY Part No.J-6335-710-A	Refer to Section 11 Video Alignment

7-3. TEST SIGNAL

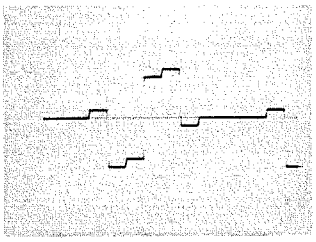
• Component Signal Generator

75% COLOR BARS (for NTSC)

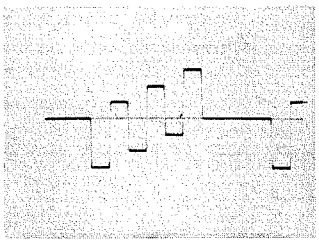
Y



R-Y

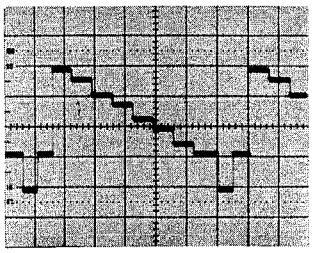


B-Y

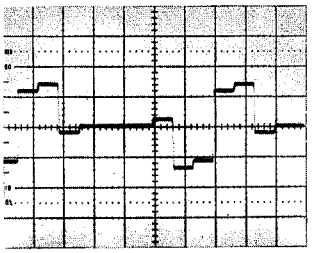


100% COLOR BARS (for PAL)

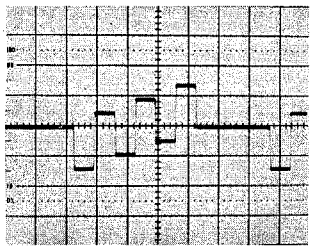
Y



R-Y

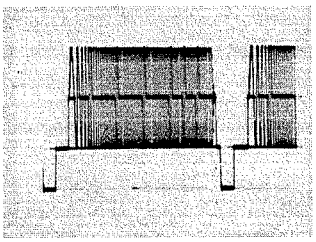


B-Y

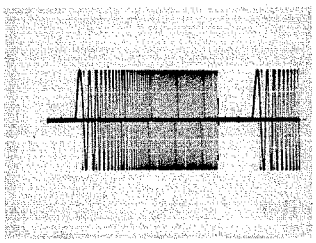


100% NALLOW LINE SWEEP

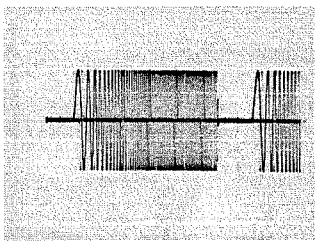
Y



R-Y

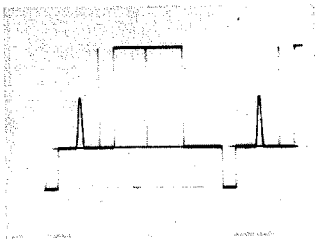


B-Y

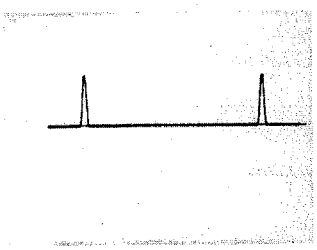


PULSE & BAR (2T)

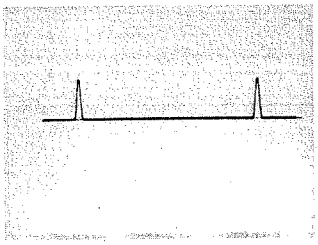
Y



R-Y

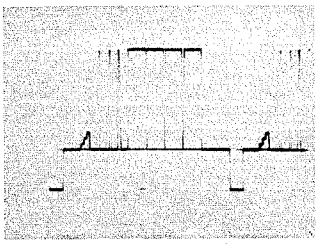


B-Y

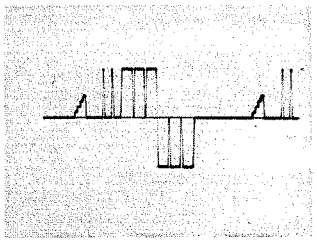


PULSE & BAR (2.4T)

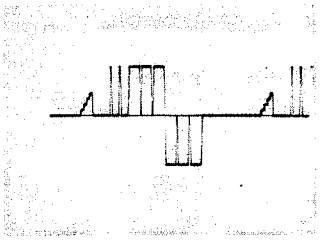
Y



R-Y

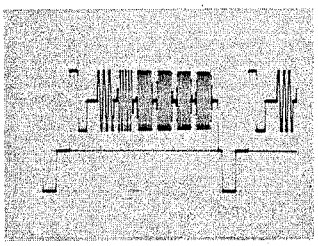


B-Y

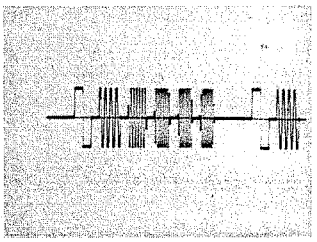


60% MULTI BURST

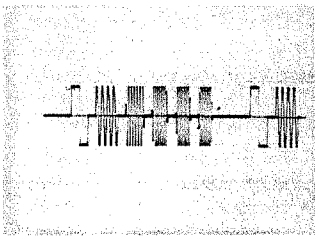
Y



R-Y

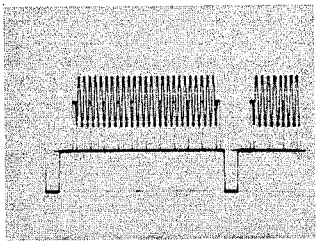


B-Y

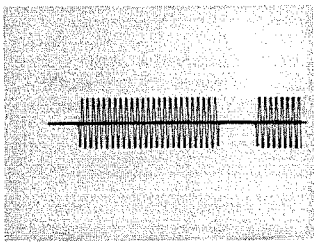


BOWTIE

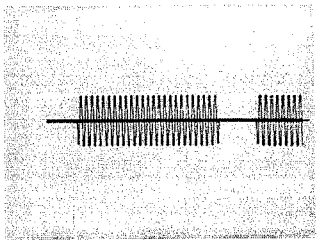
Y



R-Y

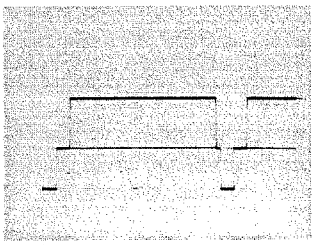


B-Y

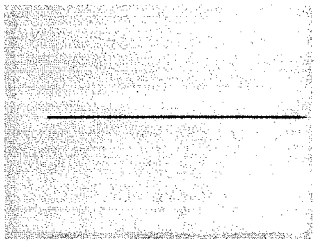


50% FLAT FIELD

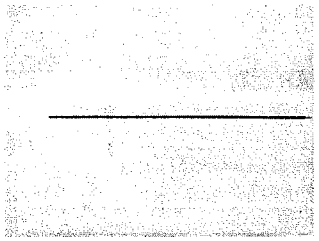
Y



R-Y

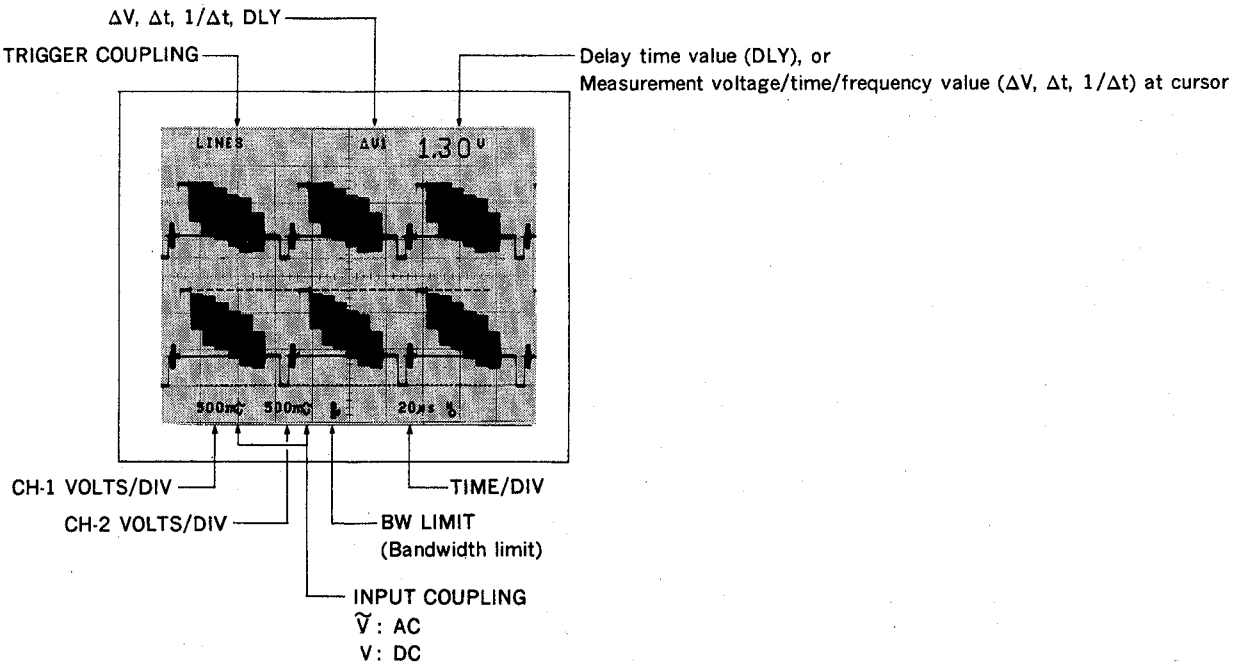


B-Y



7-4. SETTING OF OSCILLOSCOPE

- With waveform photograph used for waveform display :
  The setting conditions are displayed on the photograph as follows.



SECTION 8
POWER SUPPLY AND SYSTEM CONTROL ALIGNMENT

[Equipment Required]

- Frequency Counter (Advantest TR5821 or equivalent)
- DC Power Supply (SONY AC-500/550/500CE/550CE or CMA-8/8A/8CE/8ACE)

[Switch Setting before Adjustment]

Display	
LIGHT switch	: ON
Audio Functions	
MONITOR SELECT switch	: MIX
AUDIO LEVEL knobs	: Fully clockwise
AUDIO SELECT switches	: AUTO
AUDIO IN switches	: LINE
+48 V switches	: OFF
MONITOR knob	: MAX
Time Code Functions	
DISPLAY switch	: CTL
TC mode switch 2	: R-RUN
TC mode switch 1	: PRESET
Switches on the Board	
S550/TC-86 board	: MENU
S700/VO-46 board	: S700

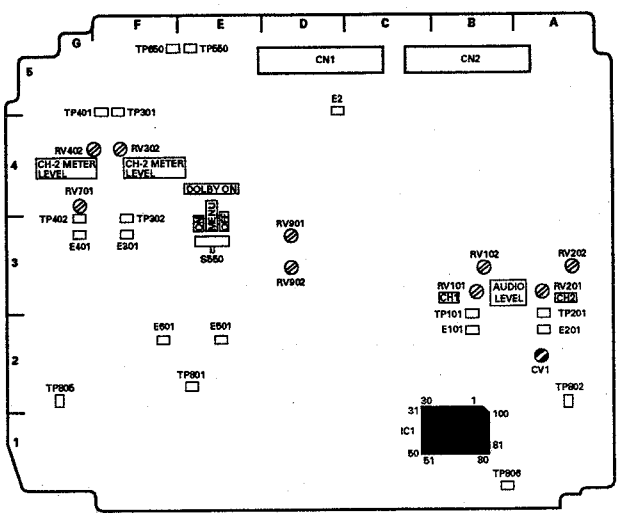
Note: Do not touch the switches and knobs as mentioned above without particular indication.

8-1. CLOCK FREQUENCY ADJUSTMENT

Equipment: Frequency Counter
Preparation:
- Input signal: No signal
- EE mode

Test point: Pin11 of IC1/TC-86 Board
Adjusting point: ⊘ CV1/TC-86 Board
Specification: 512.000 ± 0.001 Hz

TC-86 BOARD -A SIDE-



SECTION 9
SERVO ALIGNMENT

[Equipment Required]

- DC Power Supply (SONY AC-500/550/500CE/550CE or CMA-8/8A/8CE/8ACE)
- Blank Tape (SONY BCT-20MA or equivalent)

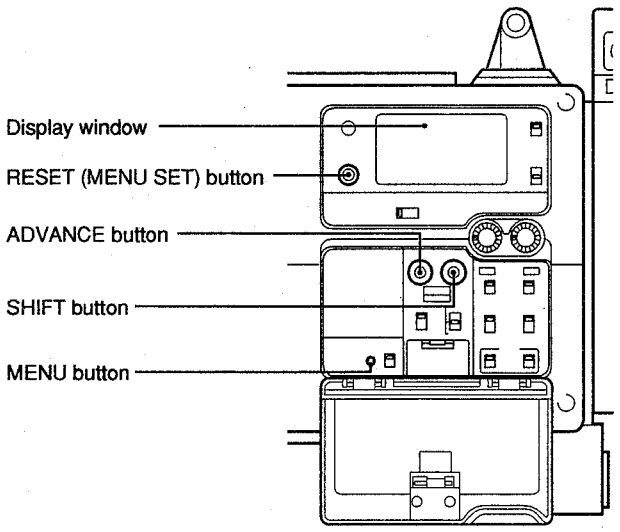
[Switch Setting before Adjustment]

Display	
LIGHT switch	: ON
Audio Functions	
MONITOR SELECT switch	: MIX
AUDIO LEVEL knobs	: Fully clockwise
AUDIO SELECT switches	: AUTO
AUDIO IN switches	: LINE
+48 V switches	: OFF
MONITOR knob	: MAX
Time Code Functions	
DISPLAY switch	: CTL
TC mode switch 2	: R-RUN
TC mode switch 1	: PRESET
Switches on the Board	
S550/TC-86 board	: MENU
S700/VO-46 board	:

Note: Do not touch the switches and knobs as mentioned above without particular indication.

[Notes on Adjustment]

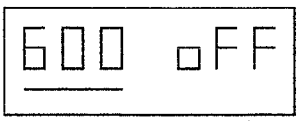
- Blank tape means a cassette tape on which no video/audio signals are recorded.



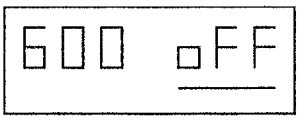
9-1. CAPSTAN FREE SPEED ADJUSTMENT

Adjustment procedure

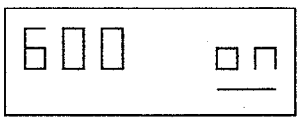
1. Confirm that no tape is inside the unit.
2. Enter maintenance menu, and select the menu number 601.
   (1)While pressing the SHIFT button, press the MENU button. And then remove a hand from the SHIFT button and keep pressing the MENU button more than 1 second.
   Indication in the display window
   (In the following description, an underscore indicates a portion of the display which is blinking.)



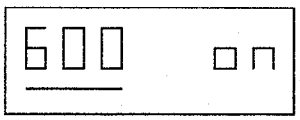
   (2)Press the RESET(MENU SET) button once, then "OFF" is blinking.
   Indication in the display window



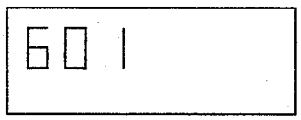
   Whenever pressing the RESET(MENU SET) button, "600" and "OFF" is blinking alternately.
   (3)Press the ADVANCE button once, then select "ON"
   Indication in the display window



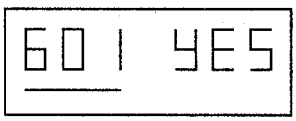
   Whenever pressing the ADVANCE button, "ON" and "OFF" is set alternately.
   (4)Press the RESET(MENU SET) button once.
   Indication in the display window



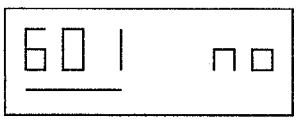
   Whenever pressing the RESET(MENU SET) button, "600" and "ON" is blinking alternately.
   (5) Press the ADVANCE button once, then menu number 601 is indicated.
   Indication in the display window



   Whenever pressing the ADVANCE button, indication cycles through the following menu number.
   600→601→602→.... →509→600→601→....
   Whenever pressing the SHIFT button, indication cycles through the following menu number.
   600→509→508→....→601→600→509→....
3. Press the RESET(MENU SET) button.
4. After confirmed the capstan turns, wait for a while.(max. 60 sec.)
5. Confirm the following indication in the display window.



   If the following figure is displayed, exit the menu number 601 once. And perform procedure 2 and later.
   When the menu has no change, check the unit error.

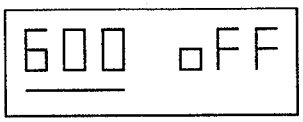


6. Press the MENU button to exit the maintenance menu.
   The display window returns to the state before entering the maintenance menu.

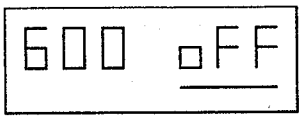
9-2. STOP SERVO ADJUSTMENT

Adjustment procedure:

1. Insert a blank tape (BCT-20MA) into the unit.
2. Enter maintenence menu, and select the menu number 602.
   (1)While pressing the SHIFT button, press the MENU button. And then remove a hand from the SHIFT button and keep pressing the MENU button more than 1 second.
   Indication in the display window.
   (In the following description, an underscore indicates a portion of the display which is blinking.)

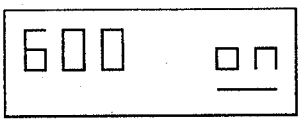


   (2)Press the RESET(MENU SET) button once, then "OFF" is blinking.
   Indication in the display window



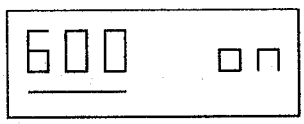
   Whenever pressing the RESET(MENU SET) button, "600" and "OFF" is blinking alternately.

   (3)Press the ADVANCE button once, then select "ON".
   Indication in the display window

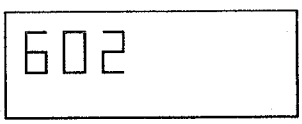


   Whenever pressing the ADVANCE button, "ON" and "OFF" is set alternately.

   (4)Press the RESET(MENU SET) button once.
   Indication in the display window



   Whenever pressing the RESET(MENU SET) button, "600" and "ON" is blinking alternately.
   (5)Press the ADVANCE button twice, then menu number 602 is indicated.
   Indication in the display window



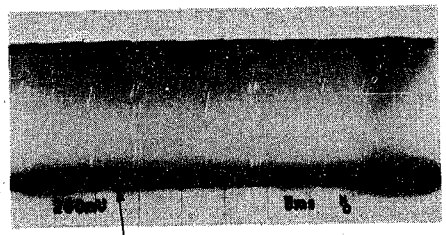
   Pressing the ADVANCE button cycles through the following menu number.
   600→601→602→....→509→600→601→....
   Pressing the SHIFT button cycles through the following menu number.
   600→509→508→....→601→600→509→....

3. Press the PLAY button. Confirm that the capstan turns a little, and then stops.

4. Press the following buttons so that the following specification is satisfied.

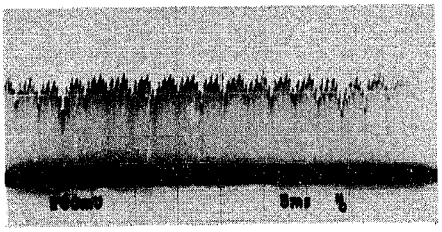
   Equipment: Oscilloscope
   Test point: CH-2:TP201/SS-57 Board
   Trigger: CH-1:TP203/SS-57 Board
   Adjustment button:
   F FWD button, REW button
   Specification:

OK

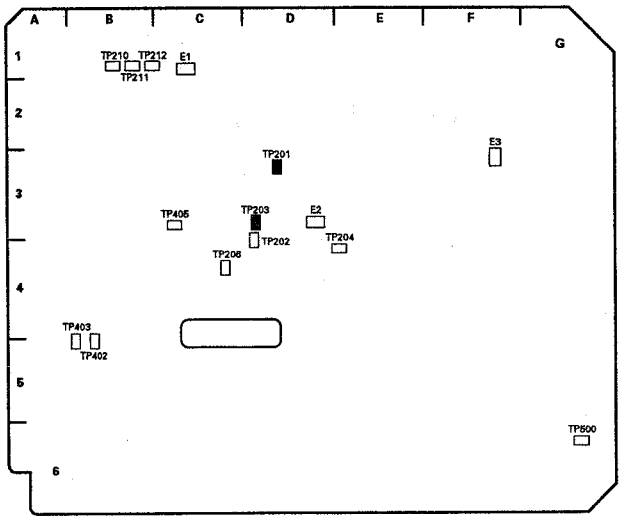


No interval between underline of waveform.

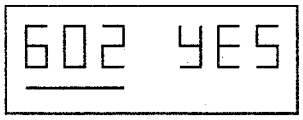
NG



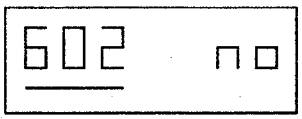
SS-57 BOARD -A SIDE-



5. Press the RESET(MENU SET) button, and confirm the following indication in the display window.



If following figure displayed, press the STOP button and exit the menu number 602. And perform procedure 2 and later.
When the menu has no change, check the unit error.



6. Press alternately the STOP and PLAY buttons serial times, confirm the specification is satisfied.

7. Put the unit into Enter the STOP mode.(Press the STOP button.)

8. Press the MENU button to exit the maintenance menu. The display window returns to the state before entering the maintenance menu.

SECTION 10
AUDIO ALIGNMENT

[Equipment Required] for NTSC

- Oscilloscope (Tektronix 2445B/200 MHz or equivalent)
- Digital Voltmeter (Advantest TR6845 or equivalent)
- Frequency Counter (Advantest TR5821 or equivalent)
- Audio Signal Generator (HP8904 or equivalent)
- Audio Level Meter (HP3400A or equivalent)
- Standard Playback Unit (SONY PVW-2600 or equivalent)
- DC Power Supply (SONY AC-500/550 or CMA-8/8A)
- Blank Tape (SONY BCT-20MA or equivalent)
- Alignment Tape CR8-1A (Sony part No.; 8-960-097-45)

[Alignment tape contents]
CR8-1A (Sony part No.; 8-960-097-45)

TIME min. sec	AUDIO TRACK	VIDEO TRACK	CTL TRACK
0: 00 – 2: 55	1 kHz, 0 VU *1	—	CTL
2: 55 – 3: 00	Blank		
3: 00 – 4: 55	10 kHz, -10 VU	—	CTL
4: 55 – 5: 00	Blank		
5: 00 – 5: 55	1 kHz, -20 VU	—	CTL
5: 55 – 6: 00	Blank		
6: 00 – 6: 25	40 Hz, -20 VU *2	—	CTL
6: 25 – 6: 30	Blank		
6: 30 – 6: 55	7 kHz, -20 VU *2	—	CTL
6: 55 – 7: 00	Blank		
7: 00 – 7: 25	10 kHz, -20 VU *2	—	CTL
7: 25 – 7: 30	Blank		
7: 30 – 7: 55	15 kHz, -20 VU *2	—	CTL
7: 55 – 8: 00	Blank		
10: 00	1 kHz, 0 VU	—	1 kHz, 0 VU

Note:
*1. When the tape is played back to check or adjust the audio reference level, the output level (+4 dB) should be calibrated in accordance with the value described below.

Example) Calibration level = –0.5 dB
Output level = +4 dB –0.5 dB = +3.5 dB

*2. When the tape is played back to check or adjust the audio frequency response, the output level should be calibrated with the calibration value.

[Equipment Required] for PAL

- Oscilloscope (Tektronix 2445B/200 MHz or equivalent)
- Digital Voltmeter (Advantest TR6845 or equivalent)
- Frequency Counter (Advantest TR5821 or equivalent)
- Audio Signal Generator (HP8904 or equivalent)
- Audio Level Meter (HP3400A or equivalent)
- Standard Playback Unit (SONY PVW-2600P or equivalent)
- DC Power Supply (SONY AC-500CE/550CE or CMA-8CE/8ACE)
- Blank Tape (SONY BCT-20MA or equivalent)
- Alignment Tape
  CR8-1B PS (Sony part No.; 8-960-096-86)

[Alignment tape contents]
CR8-1B PS (Sony part No.; 8-960-096-86)

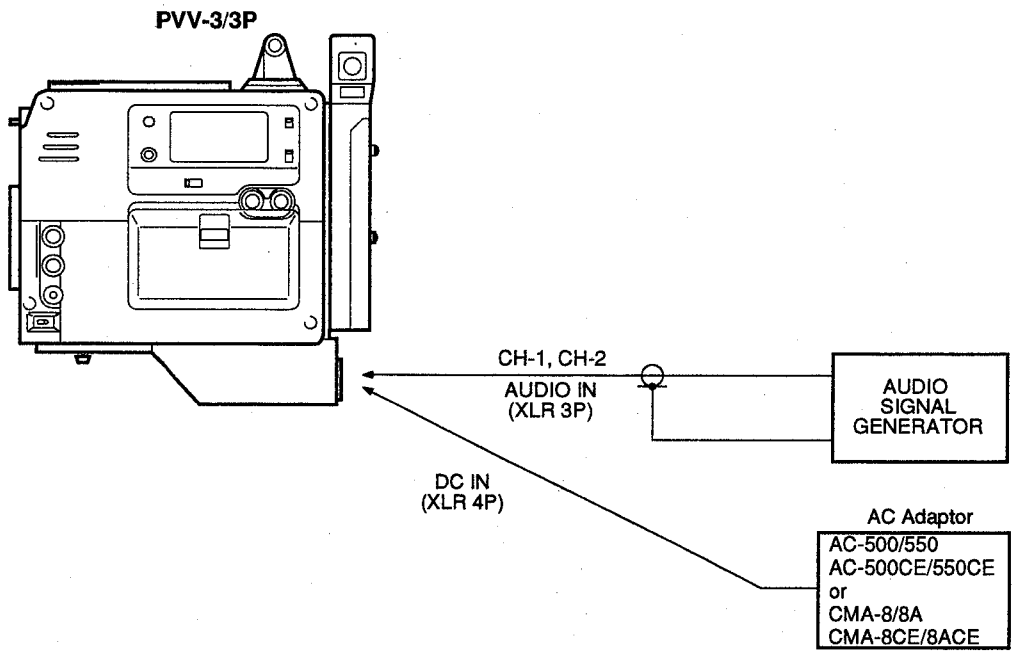
TIME min. sec	AUDIO TRACK
0: 00 – 3: 00	1 kHz/0 VU *1
3: 00 – 5: 00	15 kHz/0 VU
5: 00 – 6: 00	1 kHz/-20 VU
6: 00 – 6: 30	40 Hz/-20 VU *2
6: 30 – 7: 00	7 kHz/-20 VU *2
7: 00 – 7: 30	10 kHz/-20 VU *2
7: 30 – 8: 00	15 kHz/-20 VU *2

Note:
*1. When the tape is played back to check or adjust the audio reference level, the output level (+4 dB) should be calibrated in accordance with the value described below.

Example) Calibration level = –0.5 dB
Output level = +4 dB –0.5 dB = +3.5 dB

*2. When the tape is played back to check or adjust the audio frequency response, the output level should be calibrated with the calibration value.

[Connection]



[Switch Setting before Adjustment]

Display	
LIGHT switch	: ON
Audio Functions	
MONITOR SELECT switch	: MIX
AUDIO LEVEL knobs	: Fully clockwise
AUDIO SELECT switches	: AUTO
AUDIO IN switches	: LINE
+48 V switches	: OFF
MONITOR knob	: MAX
Time Code Functions	
DISPLAY switch	: CTL
TC mode switch 2	: R-RUN
TC mode switch 1	: PRESET
Switches on the Board	
S550/TC-86 board	: MENU
S700/VO-46 board	: S700

Note: Do not touch the switches and knobs as mentioned above without particular indication.

[Preparation before Adjustment]

Cleaning of stationary heads

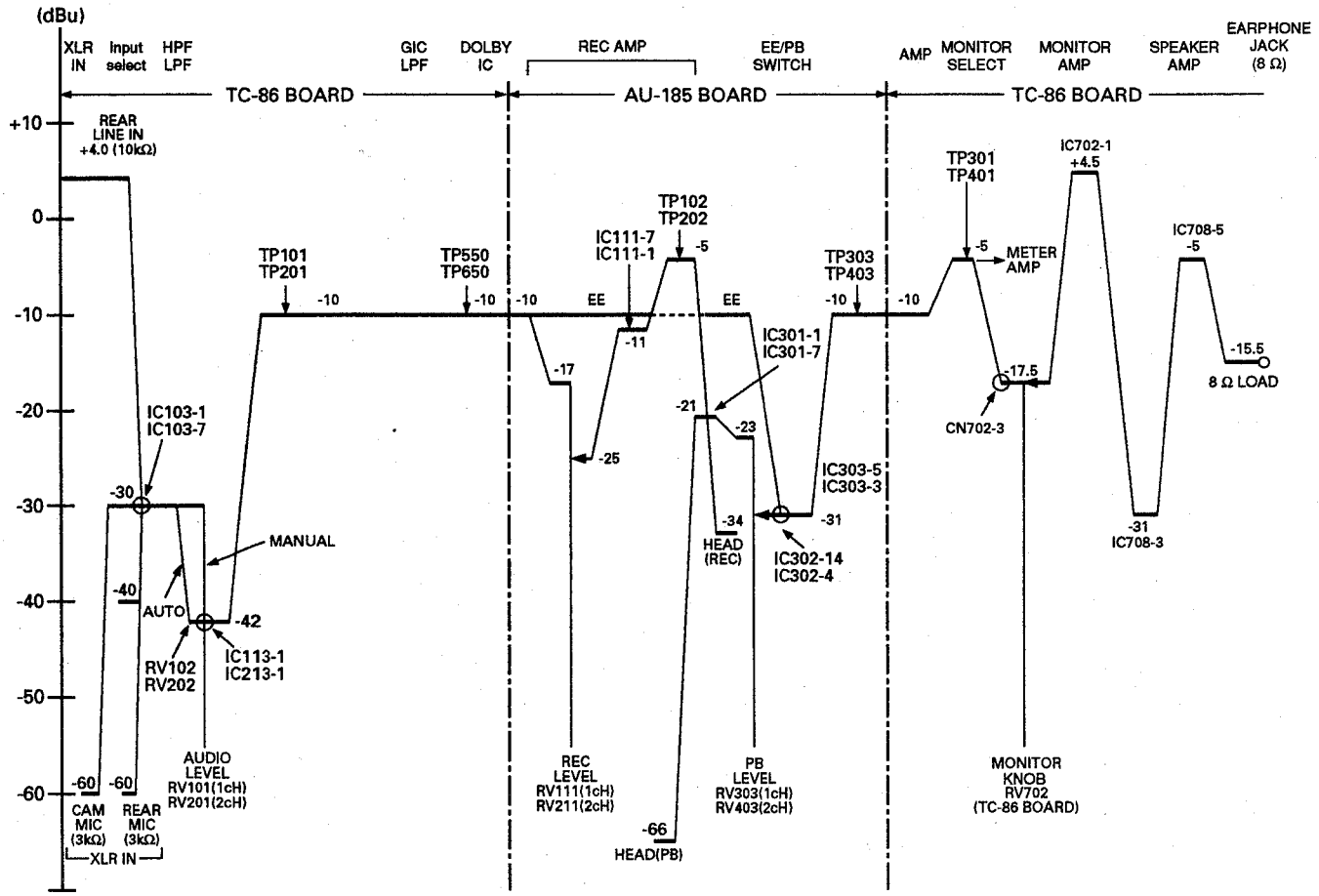
Clean stationary heads by the cleaning piece moistened with cleaning fluid.
After the fluid vaporizes, wipe off the heads by a not-weaved cloth or cleaning piece.

[Notes on Adjustment]

- Blank tape means a cassette tape on which no video/ audio signals are recorded.
- When an alignment tape(CR8-1A or CR8-1B PS) is played back, specification should be corrected according to the correction value mentioned in the tape level.
- The alignment tape is used within the limits about 50 times and recommend to manage by marking.
- Standard playback unit should be the unit which audio head phase, playback frequency response, playback level adjustments.
  And also adjusted with playback video phase, playback Y/C delay and playback C/C delay adjustments are performed.
- 0 dBu = 0.775 Vrms

[Level Diagram]

AUDIO SYSTEM LEVEL DIAGRAM



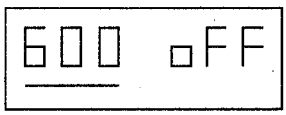
[Menu Selection]

In the following audio alignment, change the setting of system menu numbers 303 and 306.

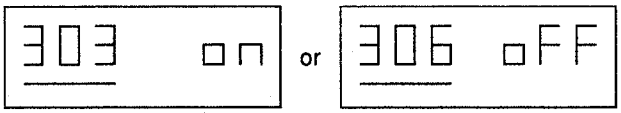
10-1. Audio Level Volume Reference Position Adjustment
10-2. Limiter Level Adjustment
10-3. Meter Level Adjustment
10-8. Overall Recording Level Adjustment
10-9. Overall Dolby Frequency Response Adjustmnet
10-10. Overall Channel Phase Adjustment

How to set the menu numbers 303 and 306 is as follows.

1. How to set the menu number 303 to "OFF" or 306 to "ON"
   (1)While pressing the SHIFT button, press the MENU button. And then remove a hand from the SHIFT button and keep pressing the MENU button more than 1 second.
   Indication in the display window
   (In the following description, an underscore indicates a portion of the display which is blinking.)

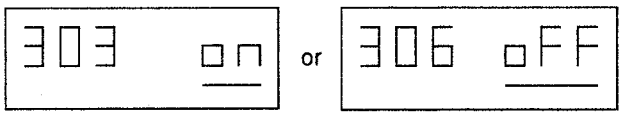


   (2)Press the ADVANCE button or SHIFT button, then menu number (303 or 306) is indicated.
   Indication in the display window



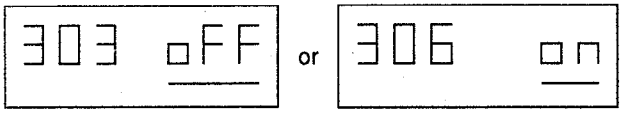
   Whenever pressing the ADVANCE button, indication cycles through the following menu number.
   600→ 301→ . . . . →305→306→ . . . .
   Whenever pressing the SHIFT button, indication cycles through the following menu number.
   600→ 509→ . . . . →307→306→ . . . .

   (3)Press the RESET(MENU SET) button once, then "ON/OFF" side is blinking.
   Indication in the display window



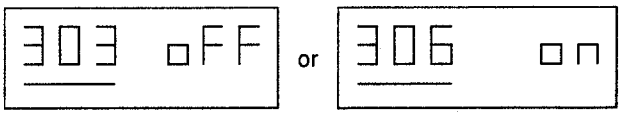
   Whenever pressing the RESET(MENU SET) button, menu number (303 or 306) and current setting (ON or OFF) is blinking alternately.

   (4)Press the ADVANCE button once, then select "ON/OFF".
   Indication in the display window



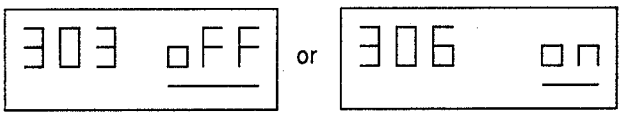
   Whenever pressing the ADVANCE button, "ON" setting and "OFF" setting is alternately.

   (5)Press the RESET(MENU SET) button once.
   Indication in the display window



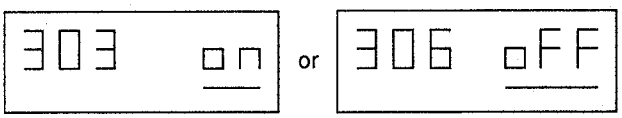
   Whenever pressing the RESET(MENU SET) button, menu number (303 or 306) and current setting (OFF or ON) is blinking alternately.

2. How to exit system menu by setting the menu number 303 to "ON" or 306 to "OFF".
   (1)Press the RESET(MENU SET) button, then "ON/OFF" side is blinking.
   Indication in the display window.



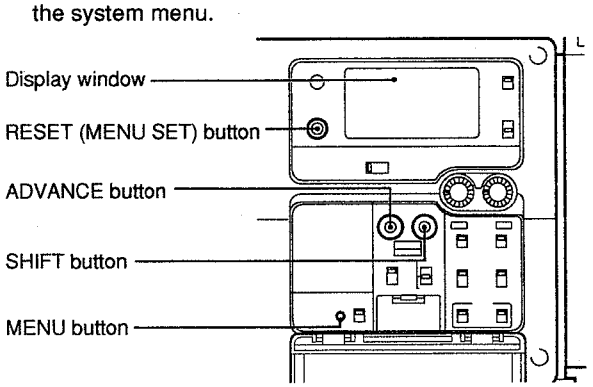
   Pressing the RESET(MENU SET) button changes menu number or current setting blinking alternately.

   (2)Press the ADVANCE button once, then select "ON/OFF".
   Indication in the display window.



   Whenever pressing the ADVANCE button, "ON" setting and "OFF" setting is alternately.

   (3)Press the MENU button.
   The display window returns to the state before entering the system menu.



10-1. AUDIO LEVEL VOLUME REFERENCE POSITION ADJUSTMENT

Equipment: Audio Level Meter, Audio Signal Generator
Preparation:
- Set the AUDIO SELECT switches to MANUAL position.
- Set the menu numbers 303 to OFF and 306 to ON.
- AUDIO INPUT CH-1/CH-2: 1 kHz, + 4.0 dBu
- EE mode

Test point: TP101/TC-86 Board (CH-1)
TP201/TC-86 Board (CH-2)
Adjusting point:
RV102/TC-86 Board (CH-1)
RV202/TC-86 Board (CH-2)
Specification: −10.0 ± 0.1 dBu

Note: After the adjustment, be sure to set the menu numbers 303 to ON, 306 to OFF and set the AUDIO SELECT switches to AUTO position.

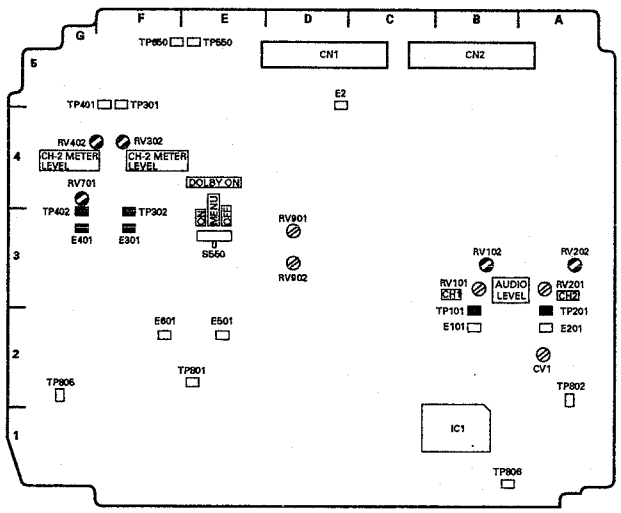
10-2. LIMITER LEVEL ADJUSTMENT

Equipment: Audio Level Meter, Audio Signal Generator
Preparation:
- Set the AUDIO SELECT switches to MANUAL position.
- Set the menu number 306 to ON.
- AUDIO INPUT CH-1/CH-2: 1 kHz, + 14 dBu
- EE mode

Test point: TP101/TC-86 Board (CH-1)
TP201/TC-86 Board (CH-2)
Adjusting point:
RV701/TC-86 Board (CH-1)
Specification: [for NTSC] −0.5 ± 0.2 dBu
[for PAL] −1.5 ± 0.2 dBu

Note: After the adjustment, be sure to set the menu number 306 to OFF and set the AUDIO SELECT switches to AUTO position.

TC-86 BOARD -A SIDE-



10-3. METER LEVEL ADJUSTMENT

Equipment: Digital Voltmeter, Audio Signal Generator
Preparation:
- Set the AUDIO SELECT switches to MANUAL position.
- Set the menu number 306 to ON.
- AUDIO INPUT CH-1/CH-2: 1 kHz, + 4.0 dBu
- EE mode

Test point: TP302/TC-86 Board (CH-1)
GND: E301
TP402/TC-86 Board (CH-2)
GND: E401
Adjusting point:
RV302/TC-86 Board (CH-1)
RV402/TC-86 Board (CH-2)
Specification: 1.47 ± 0.01 V dc

Note: After the adjustment, be sure to set the menu number 306 to OFF and set the AUDIO SELECT switches to AUTO position.

10-4. PLAYBACK FREQUENCY RESPONSE ADJUSTMENT

Equipment: Audio Level Meter
Preparation:
- Set the menu number 603 to ON. (Refer to page 2-51.)
- Insert an alignment tape (CR8-1A or CR8-1B PS) into the unit and play back the 40 Hz,1 kHz,7 kHz,10 kHz, 15 kHz and - 20 VU portions (5:00-8:00).

Test point: TP303/AU-185 Board (CH-1)
TP403/AU-185 Board (CH-2)
Adjusting point:
RV302/AU-185 Board (CH-1)
RV402/AU-185 Board (CH-2)
Specification:

Frequency (Hz)	Output level (dB)
40	0 ± 3
1 k	0 (Reference)
7 k	0 ± 1
10 k	0 ± 1
15 k	0 ± 1.5

CH-1 and CH-2
- When the specification is not satisfied at the 10 kHz portion, solder the following points and perform the adjustment again.
CH-1: SL301/AU-185 Board
CH-2: SL401/AU-185 Board

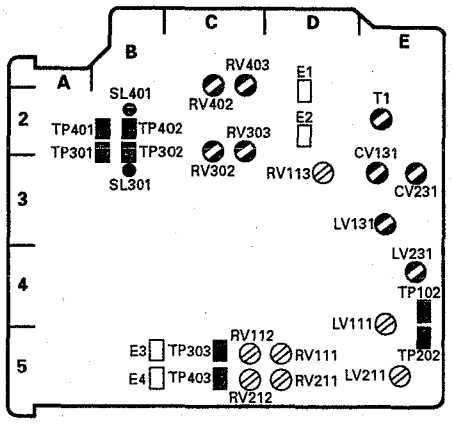
Note: Each output level should be calibrated with the calibration value. (Refer to page 10-1 or 10-2.) After the adjustment, be sure to set the menu number 603 to OFF.

10-5. PLAYBACK REFERENCE LEVEL ADJUSTMENT

Equipment: Audio Level Meter
Preparation:
- Set the menu number 603 to ON. (Refer to page 2-51.)
- Insert an alignment tape (CR8-1A or CR8-1B PS) into the unit and play back the 1 kHz,0 VU portion (0:00-3:00).

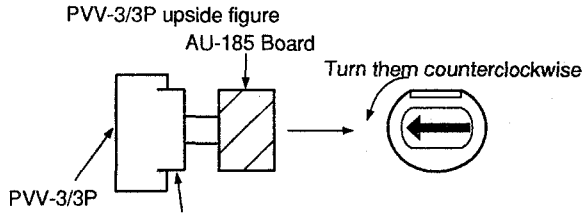
Test point: TP303/AU-185 Board (CH-1)
TP403/AU-185 Board (CH-2)
Adjusting point:
RV303/AU-185 Board (CH-1)
RV403/AU-185 Board (CH-2)
Specification: −10.0 ± 0.5 dBu
Note: Each output level should be calibrated with the calibration value. (Refer to page 10-1 or 10-2.) After the adjustment, be sure to set the menu number 603 to OFF.

AU-185 BOARD -A SIDE-



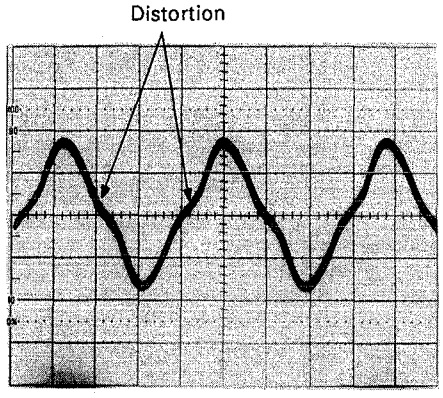
10-6. BIAS TRAP ADJUSTMENT

Equipment: Oscilloscope, Frequency Counter
Preparation:
1. AUDIO INPUT CH-1/CH-2: No signal
2. Preset the following trimmers to the position as shown in the figure.
   CV131/AU-185 Board
   CV231/AU-185 Board



3. Insert a blank tape (BCT-20MA) into the unit.
4. REC mode.

Adjustment procedure
1. Test point: TP102/AU-185 Board (CH-1)
TP202/AU-185 Board (CH-2)
Adjusting point:
LV131/AU-185 Board (CH-1)
LV231/AU-185 Board (CH-2)
Equipment: Oscilloscope
Specification:
The distortions of the right and left should be symmetrical.
Note: CH-1 and CH-2 influences each other, so adjust then repeatedly, and the confirm.



50 mV/DIV 2 µs/DIV

2. Test point: TP301/AU-185 Board (CH-1)
GND: TP302/AU-185 Board
TP401/AU-185 Board (CH-2)
GND: TP402/AU-185 Board
Equipment: Frequency Counter
Specification:
134 $^{+5}_{-15}$ kHz
When the specification is not satisfied, turn T1 on the AU-185 board.
After the adjustment, check adjustment procedure 1 again.

10-7. BIAS CURRENT ADJUSTMENT

Equipment: Audio Level Meter
Preparation:
1. AUDIO INPUT CH-1/CH-2: No signal
2. Insert a blank tape (BCT-20MA) into the unit.
3. REC mode.

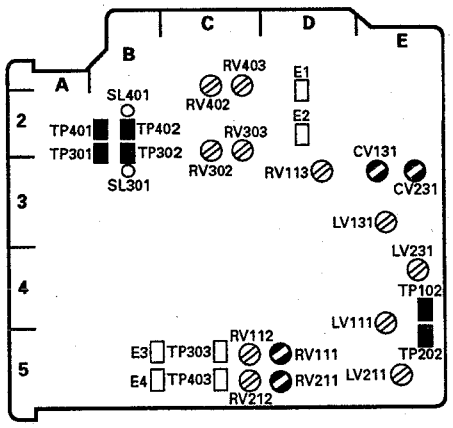
Test point: TP301/AU-185 Board (CH-1)
GND: TP302/AU-185 Board
TP401/AU-185 Board (CH-2)
GND: TP402/AU-185 Board

Adjusting point:
CV131/AU-185 Board (CH-1)
CV231/AU-185 Board (CH-2)

Specification:
18.5 $^{+1.5}_{-0.5}$ mV rms

Note: CH-1 and CH-2 influences each other, so adjust then repeatedly, and then confirm.

AU-185 BOARD -A SIDE-



10-8. OVERALL RECORDING LEVEL ADJUSTMENT

Use a standard playback unit that audio head phase, playback frequency response and playback level are adjusted by an alignment tape.

Equipment: Audio Level Meter, Audio Signal Generator
Adjustment procedure:
1. Set the AUDIO SELECT switches to MANUAL position.
2. Set the menu number 306 to ON.
3. AUDIO INPUT CH-1/CH-2: 1 kHz, + 4.0 dBu
4. Insert a blank tape (BCT-20MA) into the unit.
5. REC mode
6. Play back the recorded portion with the standard playback unit (DOLBY ON).
   Test point: AUDIO OUT CH-1/CH-2 (600 Ω load: Standard playback unit)
   Specification: +4.0 ± 0.2 dBu
   When the specification is not satisfied, perform procedure 7 and later.

7. AUDIO INPUT CH-1/CH-2: 1 kHz, + 4.0 dBu
8. Insert a blank tape (BCT-20MA) into the unit.
9. REC mode
   Test point: TP102/AU-185 Board (CH-1)
   TP202/AU-185 Board (CH-2)
   Adjusting point:
   RV111/AU-185 Board (CH-1)
   RV211/AU-185 Board (CH-2)
   Specification: Correct the output level of procedure 6 to just enough.

Correction value = Difference level
= Specification value (+ 4.0 dBu)
– Measured value

Example) Specification value + 4.0 dBu
Measured value + 5.0 dBu
Correction value = + 4.0 dBu – (+ 5.0 dBu)
= – 1.0 dBu

After the adjustment, check procedure 6 again.

REC
↓
Measuring
(Play back with a standard playback unit)
↓
Adjustment

Note: After the adjustment, be sure to set the menu number 306 to OFF and set the AUDIO SELECT switches to AUTO position.

10-9. OVERALL DOLBY FREQUENCY RESPONSE ADJUSTMENT

Use a standard playback unit that audio head phase, playback frequency response and playback level are adjusted by an alignment tape.

Equipment: Audio Level Meter, Audio Signal Generator

Adjustment procedure:

1. Set the AUDIO SELECT switches to MANUAL position.
2. Set the menu number 306 to ON.
3. AUDIO INPUT CH-1/CH-2: 40 Hz, 1 kHz, 7 kHz, 10 kHz, 15 kHz, –16 dBu
4. Insert a blank tape(BCT-20MA) into the unit.
5. REC mode
6. Play back the recorded portion with the standard playback unit(DOLBY ON).

   Test point: AUDIO OUT CH-1/CH-2(600 Ω load: Standard playback unit)

   Specification:

   CH-1 and CH-2

Frequency (Hz)	Output level (dB)
40	$0^{+1.5}_{-3.0}$
1k	0 (Reference)
7 k	0 ± 1.0
10 k	$0^{+1.0}_{-1.5}$
15 k	$0^{+1.0}_{-1.5}$

   When the specification is not satisfied, perform procedure 7 and later.

   Note: Each output level should be calibrated with the calibration value.
   (Refer to page 10-1 or 10-2.)

7. AUDIO INPUT CH-1/CH-2: 10 kHz,15 kHz,- 16 dBu
8. Insert a blank tape(BCT-20MA) into the unit.
9. REC mode

   Test point: TP102/AU-185 Board (CH-1)
   TP202/AU-185 Board (CH-2)

   Adjusting point:
   Adjustment at 10 kHz portion
   RV112/AU-185 Board (CH-1)
   RV212/AU-185 Board (CH-2)
   Adjustment at 15 kHz portion
   LV111/AU-185 Board (CH-1)
   LV211/AU-185 Board (CH-2)

   Specification: Correct the half of the difference level from the center value of the specification in procedure 6.

Difference level = Specification value – Measured value

Correction value = 1/2 x Difference level
= 1/2 x (Specification value – Measured value)

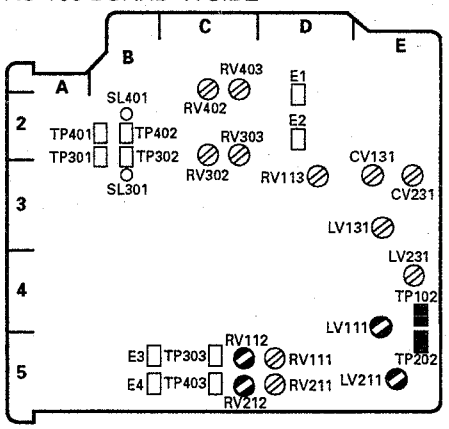
Example) Specification value 0 dB
Measured value + 2.0 dB
Correction value = 1/2 x (0 dB – (+2.0 dB))
= – 1.0 dB

After the adjustment, check procedure 6 again.

REC
↓
Measuring
(Play back with a standard playback unit)
↓
Adjustment

Note: After the adjustment, be sure to set the menu number 306 to OFF and set the AUDIO SELECT switches to AUTO position.

AU-185 BOARD -A SIDE-



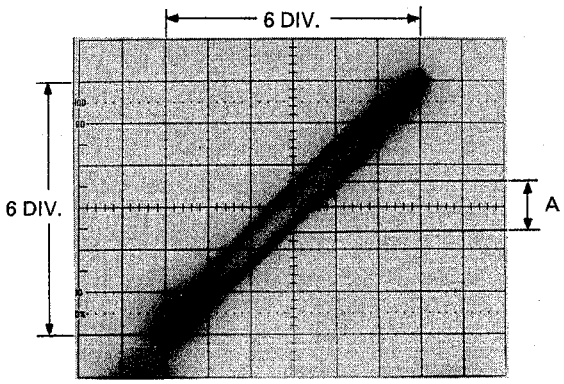
10-10. OVERALL CHANNEL PHASE ADJUSTMENT

Use a standard playback unit that audio head phase, playback frequency response and playback level are adjusted by an alignment tape.

Equipment: Audio Level Meter, Audio Signal Generator, Oscilloscope

Adjustment procedure:

1. Set the AUDIO SELECT switches to MANUAL position.
2. Set the menu number 306 to ON.
3. AUDIO INPUT CH-1/CH-2: 15 kHz,+ 4.0 dBu
4. Insert a blank tape(BCT-20MA) into the unit.
5. REC mode
6. Play back the recorded portion with the standard playback unit(DOLBY ON).
   Oscilloscope: X-Y mode (lissajous waveform)
   Test point: AUDIO OUT CH-1/CH-2(600 Ω load: Standard playback unit)
   Specification: A(phase difference) = within 10°
   When the specification is not satisfied, perform procedure 7 and later.
   Note: 1 DIV. = about 10°



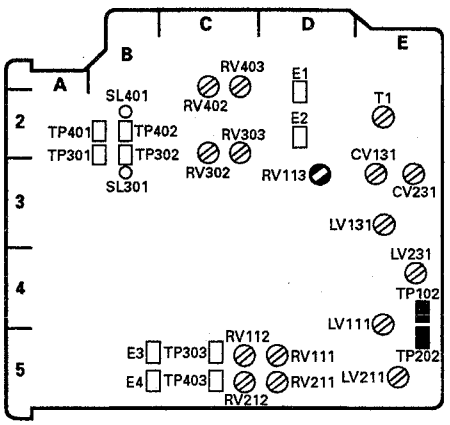
0.5 V/DIV.

7. AUDIO INPUT CH-1/CH-2: 15 kHz, +4.0 dBu
8. Insert a blank tape(BCT-20MA) into the unit.
9. REC mode
   Test point: CH-1: TP102/AU-185 Board
   CH-2: TP202/AU-185 Board
   Adjusting point: RV113/AU-185 Board
   Specification: Correct the phase difference of procedure 6.
   After the adjustment, check procedure 6 again.

REC
↓
Measuring
(Play back with a standard playback unit)
↓
Adjustment

Note: After the adjustment, be sure to set the menu number 306 to OFF and set the AUDIO SELECT switches to AUTO position.

AU-185 BOARD -A SIDE-



SECTION 11
VIDEO ALIGNMENT

[Equipment Required] for NTSC

- Oscilloscope (Tektronix 2445B/200 MHz or equivalent)
- Waveform Vector (Tektronix 1750/1780R or equivalent)
- Waveform Monitor (Tektronix WFM300 /WFM300A or equivalent)
- Component Signal Generator (Tektronix TSG300 or equivalent)
- Sweep Generator (Shibasoku VS-12CX or equivalent)
- Spectrum Analyzer (Advantest R4131 B/D or equivalent)
- Deviation Checker EW-579 (Sony part No.; J-6335-790-A)
  If you have a spectrum analyzer, a deviation checker is not necessary.
- Camera Tool EW-783 (Sony part No.; J-6337-830-A)
- Recording Current Adjustment Tool EW-571 (Sony part No.; J-6335-710-A)
  If you have the waveform vector 1780R, a recording current adjustment tool is not necessary.
- Standard Playback Unit (SONY PVW-2600 or equivalent)
- DC Power Supply (SONY AC-500/550 or CMA-8/8A)
- Blank Tape (SONY BCT-20MA or equivalent)
- Alignment Tape CR5-1B (Sony part No.; 8-960-096-41)

[Alignment tape contents]
CR5-1B (Sony part No.; 8-960-096-41)

TIME min. sec	VIDEO TRACK	AFM
0: 00	RF Sweep	No-Signal
2: 00	60% H Sweep (CTDM)	
5: 00	Pulse & Bar (CTDM)	
8: 00	Multi Burst	
11: 00	Pulse & Bar	
14: 00	75% Color Bars	400 Hz SINE WAVE 25 kHz DEVIATION
16: 30		75 kHz DEVIATION
17: 00	50% Bowtie & 12.5T	No-Signal
19: 00	Line 17 signal	
22: 00	Quad Phase	
24: 00	Flat Field	
26: 00	75% Color Bars with Dropout	
28: 00	Composite V Sweep with VISC	
30: 00		

[Equipment Required] for PAL

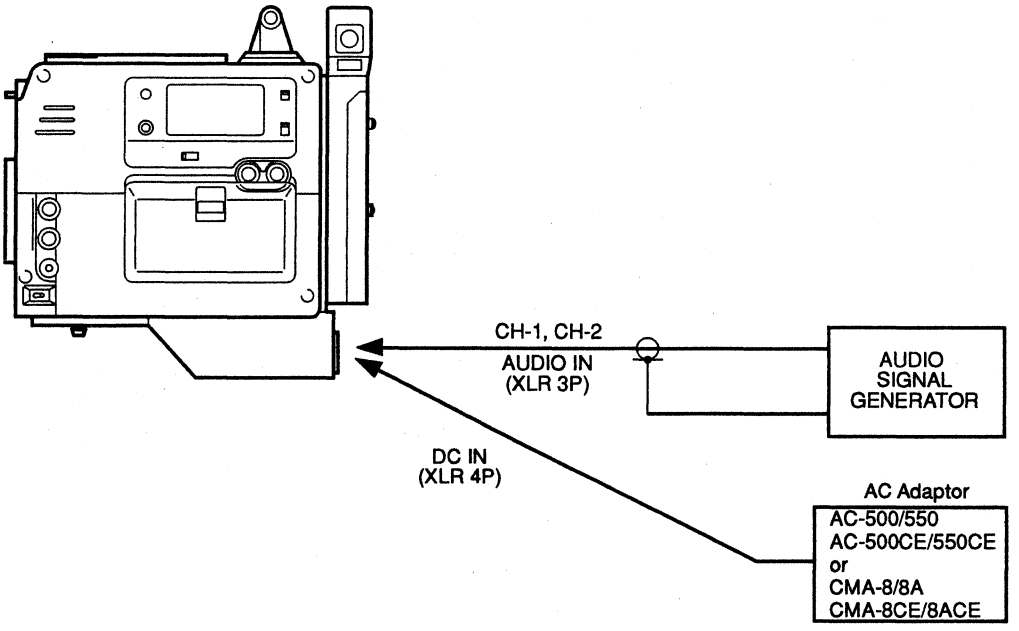
- Oscilloscope (Tektronix 2445B/200 MHz or equivalent)
- Waveform Vector (Tektronix 1751/1781R or equivalent)
- Waveform Monitor (Tektronix WFM300 /WFM300A or equivalent)
- Component Signal Generator (Tektronix TSG300 or equivalent)
- Sweep Generator (Shibasoku VS-12CX or equivalent)
- Spectrum Analyzer (Advantest R4131 B/D or equivalent)
- Deviation Checker EW-580 (Sony part No.; J-6335-800-A)
  If you have a spectrum analyzer, a deviation checker is not necessary.
- Camera Tool EW-783 (Sony part No.; J-6337-830-A)
- Recording Current Adjustment Tool EW-571 (Sony part No.; J-6335-710-A)
  If you have the waveform vector 1781R, a recording current adjustment tool is not necessary.
- Standard Playback Unit (SONY PVW-2600P or equivalent)
- DC Power Supply (SONY AC-500CE/550CE or CMA-8CE/8ACE)
- Blank Tape (SONY BCT-20MA or equivalent)
- Alignment Tape CR5-1B PS (Sony part No.; 8-960-096-91)

[Alignment tape contents]
CR5-1B PS (Sony part No.; 8-960-096-91)

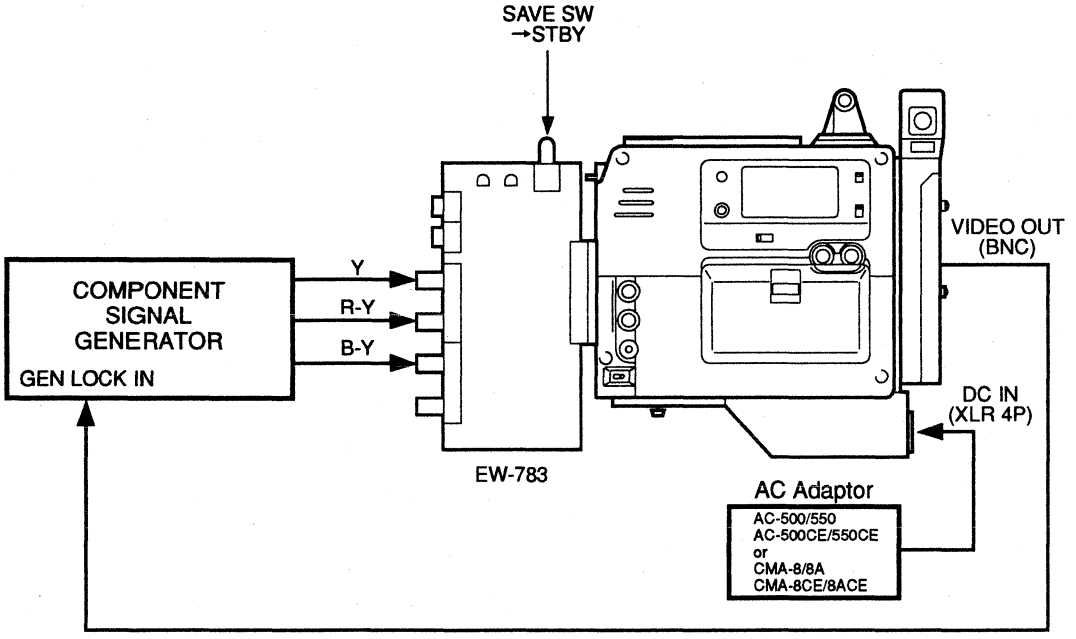
TIME min. sec	VIDEO TRACK	AFM
0: 00	RF Sweep Marker 1, 2, 4, 6, 8, 10, 12 MHz	No-Signal
2: 00	60% H-Sweep (CTDM) Marker 0.5, 1, 2, 3, 4, 5 MHz	
5: 00	Pulse & Bar (CTDM)	
8: 00	60 % Multi Burst Y : 0.5, 1, 2, 4, 5, 5.5 MHz C : 0.2, 0.5, 1, 1.5, 2 MHz	
11: 00	Pulse & Bar	
14: 00	100% Color Bars	400 Hz Sine Wave 25 kHz Deviation
16: 30		75 kHz Deviation
17: 00	50% Bowtie & 10T	No-Signal
19: 00	Line 17A signal	
22: 00	Quad Phase	
24: 00	50% Flat Field	
26: 00	100% Color Bars with Dropout	
28: 00	Composite H-Sweep with VISC	
30: 00		

[Connection]

CONNECTION 1.



CONNECTION 2.



[Switch Setting before Adjustment]

Display	
LIGHT switch	: ON
Audio Functions	
MONITOR SELECT switch	: MIX
AUDIO LEVEL knobs	: Fully clockwise
AUDIO SELECT switches	: AUTO
AUDIO IN switches	: LINE
+48 V switches	: OFF
MONITOR knob	: MAX
Time Code Functions	
DISPLAY switch	: CTL
TC mode switch 2	: R-RUN
TC mode switch 1	: PRESET
Switches on the Board	
S550/TC-86 board	: MENU
S700/VO-46 board	:

Note: Do not touch the switches and knobs as mentioned above without particular indication.

[Preparation before Adjustment]

Cleaning of stationary heads

Clean stationary heads by the cleaning piece moistened with cleaning fluid.
After the fluid vaporizes, wipe off the heads by a not-weaved cloth or cleaning piece.

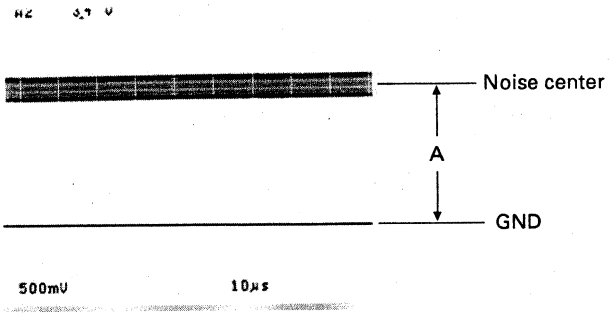
[Notes on Adjustment]

- Blank tape means a cassette tape on which no video/ audio signals are recorded.
- The alignment tape is used within the limits about 50 times and recommend to manage by marking.
- Standard playback unit should be the unit which audio head phase, playback frequency response, playback level adjustments.
  And also adjusted with playback video phase, playback Y/C delay and playback C/C delay adjustments are performed.
- 0 dBu = 0.775 Vrms

11-1. PLL VCO ERROR VOLTAGE ADJUSTMENT

Equipment: Component Signal Generator, Oscilloscope
Preparation:
- Input singnal: [for NTSC] 75% COLOR BARS
  [for PAL] 100% COLOR BARS
- Insert a blank tape (BCT-20MA) into the unit.
- REC mode

Connection: CONNECTION 2
Test point: TP401/VO-46 Board
Trigger: TP400/VO-46 Board
Adjusting point: LV400/VO-46 Board
Specification: A = 1.8 ± 0.1 V dc

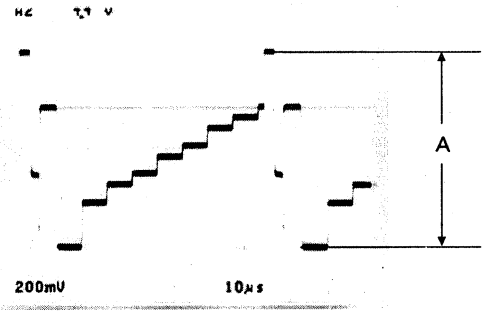


11-2. Y INPUT LEVEL ADJUSTMENT

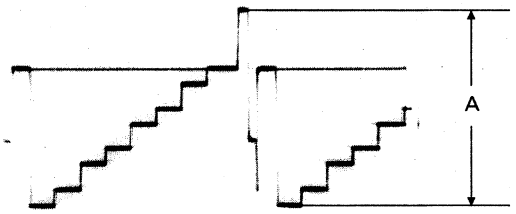
Equipment: Component Signal Generator, Oscilloscope
Preparation:
- Input singnal: [for NTSC] 75% COLOR BARS
  [for PAL] 100% COLOR BARS
- Insert a blank tape (BCT-20MA) into the unit.
- REC mode

Connection: CONNECTION 2
Test point: TP101/VO-46 Board
Trigger: TP400/VO-46 Board
Adjusting point: RV100/VO-46 Board
Specification: A = 1.00 ± 0.05 V p-p

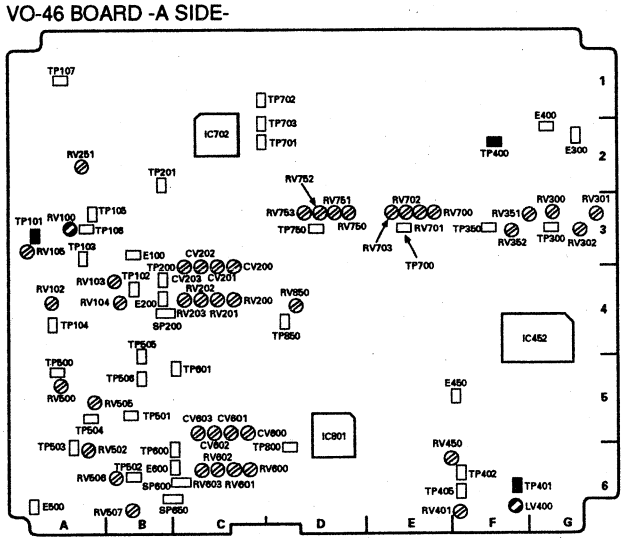
for NTSC



for PAL



VO-46 BOARD -A SIDE-

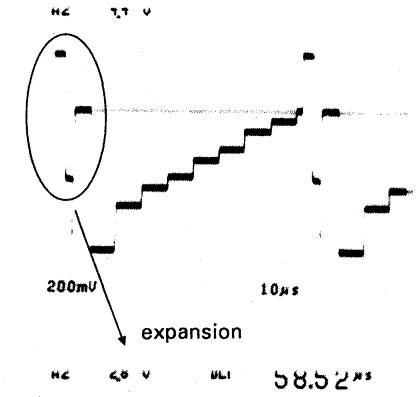


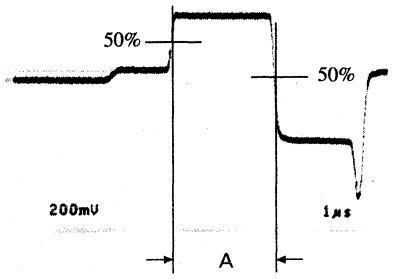
11-3. Y REF SYNC POSITION ADJUSTMENT

Equipment: Component Signal Generator, Oscilloscope
Preparation:
- Input singnal: [for NTSC] 75% COLOR BARS
  [for PAL] 100% COLOR BARS
- Insert a blank tape (BCT-20MA) into the unit.
- REC mode

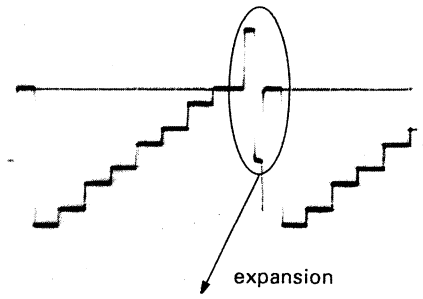
Connection: CONNECTION 2
Test point: TP101/VO-46 Board
Trigger: TP400/VO-46 Board
Adjusting point: ⊘RV401/VO-46 Board
Specification: A = 2.65 ± 0.02 µs

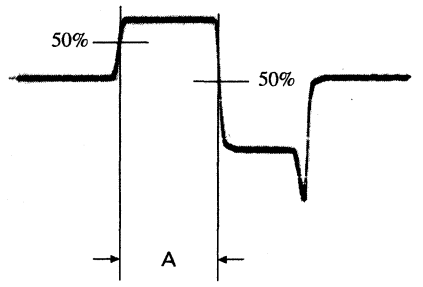
for NTSC



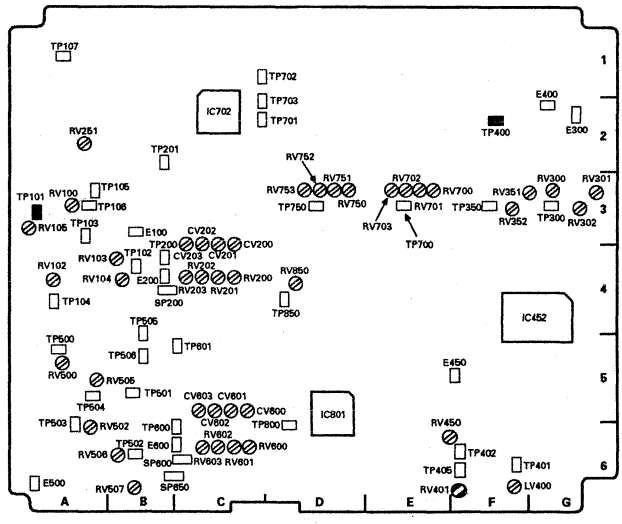


for PAL





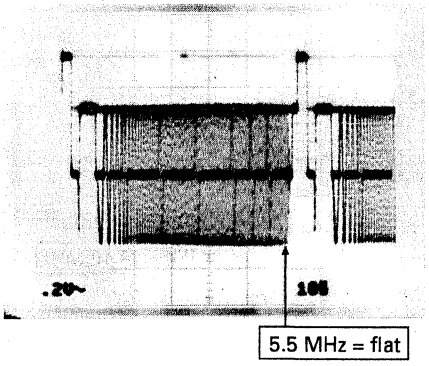
VO-46 BOARD -A SIDE-



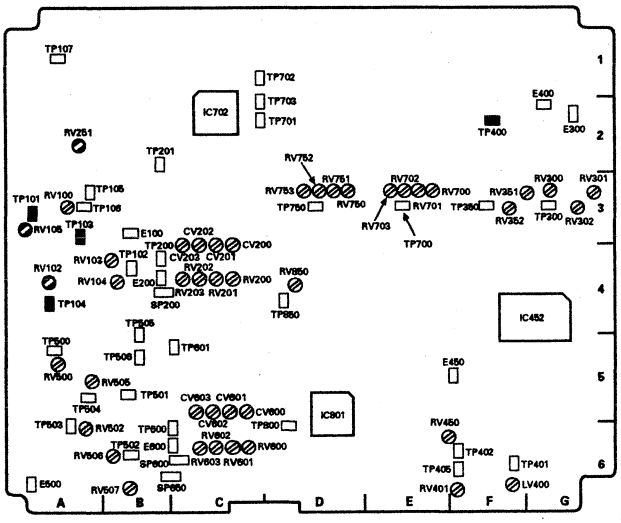
11-4. SLEW RATE LIMITER ADJUSTMENT

Equipment: Component Signal Generator, Oscilloscope
Preparation:
- Input singnal: 100% NALLOW LINE SWEEP
- Insert a blank tape (BCT-20MA) into the unit.
- REC mode

Connection: CONNECTION 2
Test point: TP101/VO-46 Board
Trigger: TP400/VO-46 Board
Adjusting point: RV251/VO-46 Board
Specification: 5.5 MHz = flat



VO-46 BOARD -A SIDE-

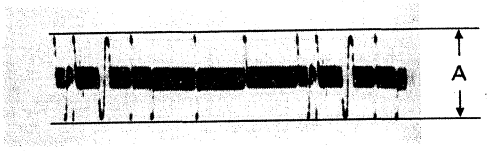


11-5. Y NONLINEAR PRE-EMPHASIS MIX LEVEL ADJUSTMENT

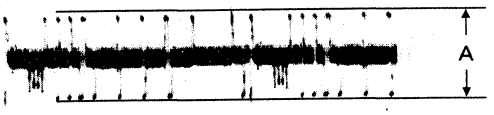
Equipment: Component Signal Generator, Oscilloscope
Preparation:
- Input singnal: [for NTSC] PULSE & BAR(2T)
  [for PAL] PULSE & BAR(2, 4T)
- Insert a blank tape (BCT-20MA) into the unit.
- REC mode

Connection: CONNECTION 2
Test point: TP103/VO-46 Board
Trigger: TP400/VO-46 Board
Adjusting point: RV102/VO-46 Board
Specification: A=100 ± 5mV

for NTSC



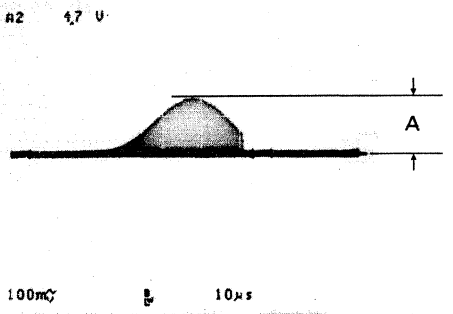
for PAL



11-6. Y REC HF ADJUSTMENT

Equipment: Component Signal Generator, Oscilloscope
Preparation:
- Input singnal: 100% NALLOW LINE SWEEP
- Insert a blank tape (BCT-20MA) into the unit.
- REC mode

Connection: CONNECTION 2
Test point: TP104/VO-46 Board
Trigger: TP400/VO-46 Board
Adjusting point: RV105/VO-46 Board
Specification: A = 150 ± 5 mV



11-7. Y CARRIER / DEVIATION ADJUSTMENT

11-7-1. Y Carrier / Deviation Adjustment (Using a Spectrum analyzer)

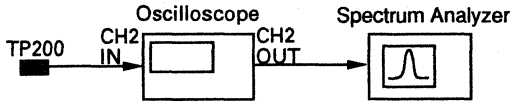
Equipment: Spectrum Analyzer, Component Signal Generator, Oscilloscope

Preparation:

- Input signal: 100% FLAT FIELD
- Insert a blank tape (BCT-20MA) into the unit.
- REC mode

Connection: CONNECTION 2

Spectrum analyzer connection



Test point: TP200/VO-46 Board

Adjusting point:

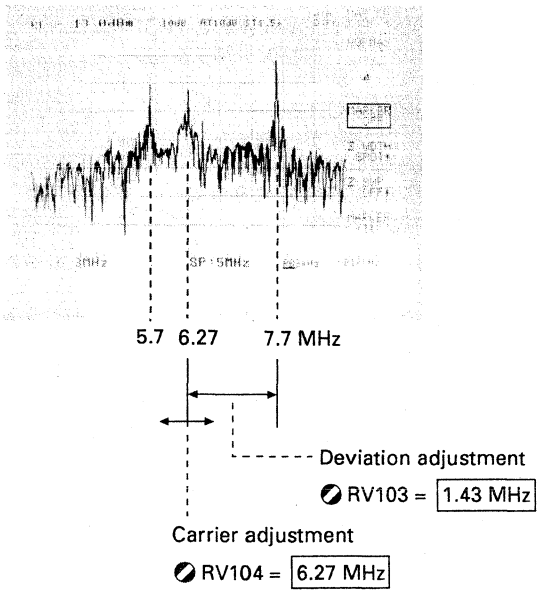
RV103/VO-46 Board
(Deviation adjustment)
RV104/VO-46 Board
(Carrier adjustment)

Specification: [for NTSC] RV103 = 1.43 MHz
[for PAL] RV103 = 1.40 MHz

[for NTSC] RV104 = 6.27 MHz
[for PAL] RV104 = 7.4 MHz

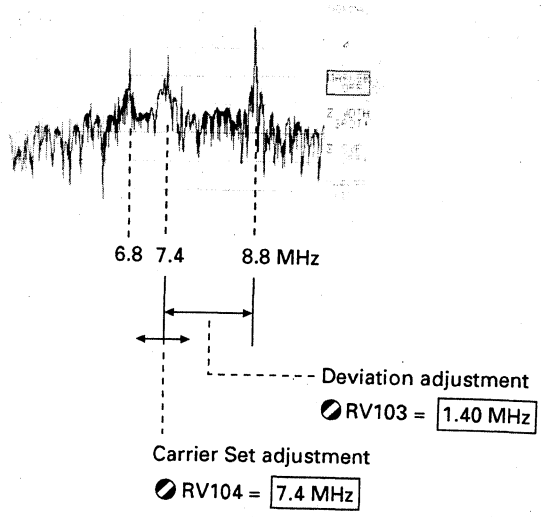
Spectrum analyzer waveform

for NTSC

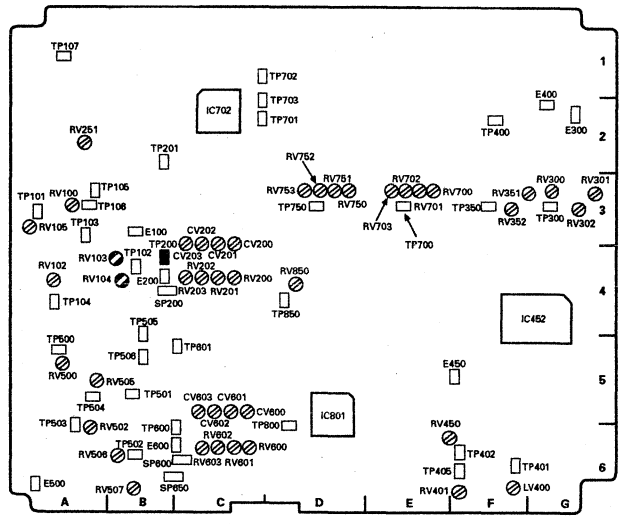


Spectrum analyzer waveform

for PAL



VO-46 BOARD -A SIDE-



11-7-2. Y Carrier / Deviation Adjustment (Using a Deviation checker)

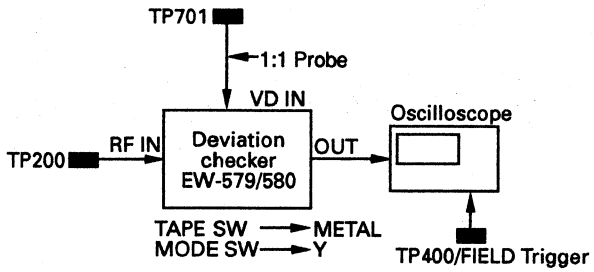
Equipment: Deviation Checker, Component Signal Generator, Oscilloscope

Preparation:

- Input signal: [for NTSC] 75% COLOR BARS
  [for PAL] 100% COLOR BARS
- Insert a blank tape (BCT-20MA) into the unit.
- REC mode

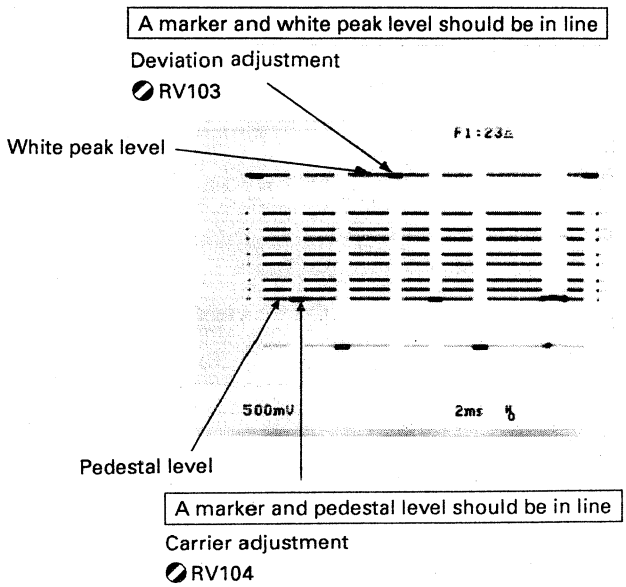
Connection: CONNECTION 2

Deviation checker connection

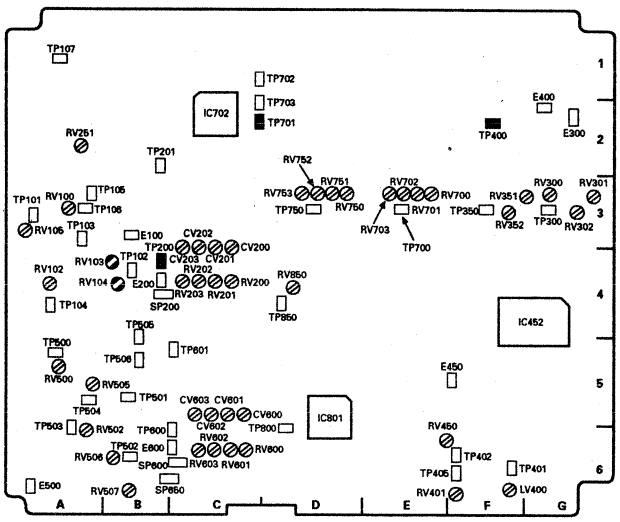


Test point: TP200/VO-46 Board
Trigger: TP400/VO-46 Board
Adjusting point:
RV103/VO-46 Board
(Deviation adjustment)
RV104/VO-46 Board
(Carrier adjustment)

Specification: RV103: A marker and white peak level should be in line.
RV104: A marker and pedestal level should be in line.



VO-46 BOARD -A SIDE-

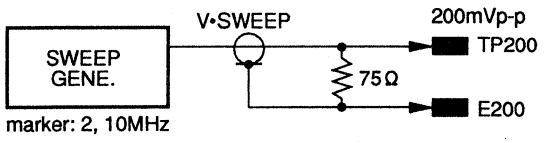


11-8. Y RF RECORDING CURRENT SYSTEM ADJUSTMENT

11-8-1. Y RF Recording Current System Adjustment (Using a Recording current adjustment tool EW-571)

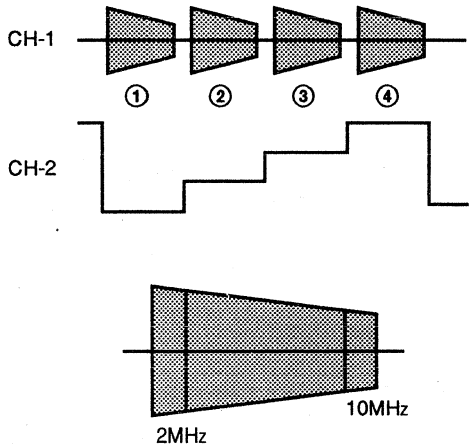
1. Y Recording Current Frequency Response Adjustment

Equipment: Sweep Generator, Oscilloscope
Preparation:
- Remove the socket SP200 on the VO-46 board.
- Connect TP200 and E200 on the VO-46 board as shown in the following figure.



- Insert a blank tape (BCT-20MA) into the unit.
- REC mode

Test point: CH1; TP201(GND:E200)/VO-46 Board
CH2; TP702/VO-46 Board (TRIG)
Adjusting point:
① CV200 (CH-1 FREQ RESP)/VO-46 Board
② CV201 (CH-2 FREQ RESP)/VO-46 Board
③ CV202 (CH-3 FREQ RESP)/VO-46 Board
④ CV203 (CH-4 FREQ RESP)/VO-46 Board
Specification: [for NTSC] 2 MHz : 10 MHz = 100 %(reference) : 75^{+10}_{-8} %
[for PAL] 2 MHz : 10 MHz = 100 %(reference) : 95 ± 10 %

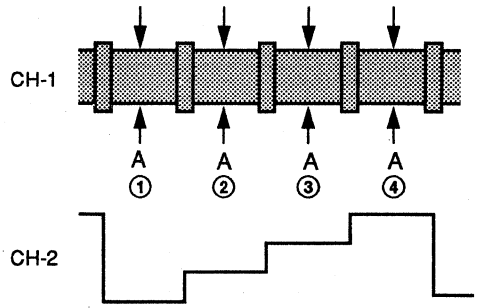


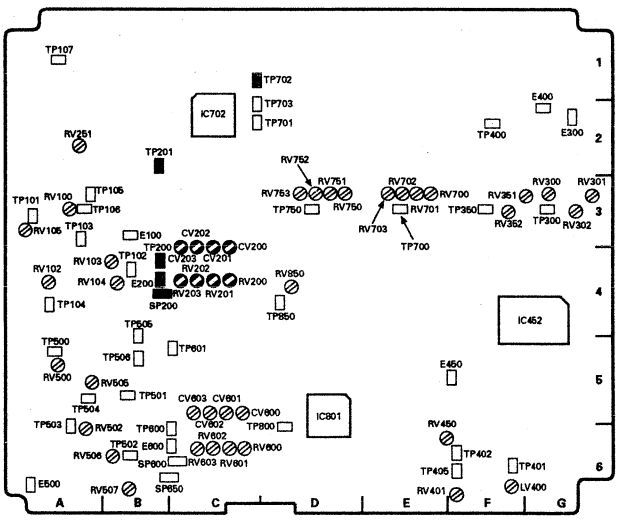
Note:
- After the adjustment, connect the socket SP200 to the original position.

2. Y Recording Current Adjustment

Equipment: Component Signal Generator, Oscilloscope
EW-783 (Camera tool)
Preparation:
- Input signal: 50 % FLAT FIELD
- Insert a blank tape (BCT-20MA) into the unit.
- REC mode

Connection: CONNECTION 2
Test point: CH1; TP201(GND:E200)/VO-46 Board
CH2; TP702/VO-46 Board (TRIG)
Adjusting point:
① RV200 (CH-1 RF Level)/VO-46 Board
② RV201 (CH-2 RF Level)/VO-46 Board
③ RV202 (CH-3 RF Level)/VO-46 Board
④ RV203 (CH-4 RF Level)/VO-46 Board
Specification: A = 1.50 ± 0.05 V p-p





3. Overall Y Recording Frequency Response Check

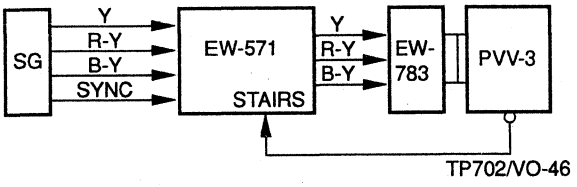
for NTSC

Equipment: Component Signal Generator, EW-571(Recording Current Adjustment Tool), EW-783(Camera Tool), Standard Playback Unit, Waveform Monitor (WFM 300/300A)

Connection:

(REC mode)

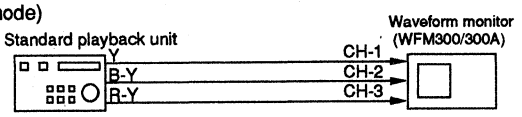
• input signal: 60% MULTI BURST



Switch settings of EW-571:

THROUGH/SWITCH: SWITCH
Other switches: any position

(PB mode)



[STEP 1]

Preparation:

- Insert a blank tape (BCT-20MA) into the unit.
- REC mode

Switch heads ① through ④ in order, record to each head in 30 through 60 seconds.

[STEP 2]

1. Insert the tape with recorded at STEP 1 into the standard playback unit.
2. Play back the recorded portion with a standard playback unit. Measure the levels at the following frequencies. The reference level is at 0.5 MHz portion of 60 % MULTI BURST.
3. When the specification is not satisfied, perform 11-8-1. Y RF Recording Current System Adjustment items 1 through 2 within the specification again.

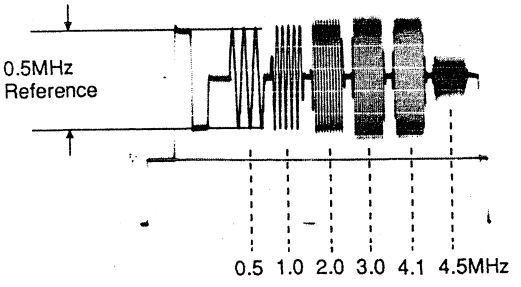
Overall Y Recording Frequency Response Check		Y RF Recording Current System Adjustment
measure low	→	more lower
measure high	→	more higher

Specification: Specification/CH-1 through CH-4

Frequency (MHz)	against measured value of alignment tape (dB)	(%)
0.5	0 dB (Reference)	100% (Reference)
1.0	± 0.4 dB	$^{+4.7}_{-4.5}$ %
2.0	± 0.4 dB	$^{+4.7}_{-4.5}$ %
3.0	± 0.4 dB	$^{+4.7}_{-4.5}$ %
4.1	± 1.0 dB	$^{+12.2}_{-10.9}$ %
4.5	$^{+1.5}_{-2.0}$ dB	$^{+18.9}_{-20.6}$ %

Differerence of among CH-1 through CH-4 should be within 0.4 dB at 4.1 MHz.

- Measure the levels at the center of moire.



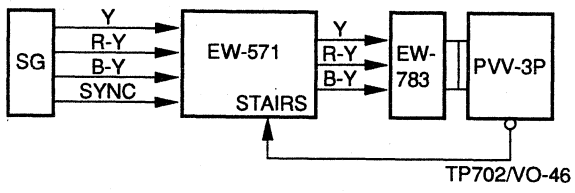
for PAL

Equipment: Component Signal Generator, EW-571(Recording Current Adjustment Tool), EW-783(Camera Tool), Standard Playback Unit, Waveform Monitor (WFM300/300A)

Connection:

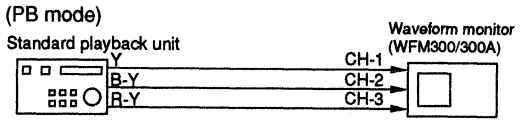
(REC mode)

• input signal: 60% MULTI BURST



Switch settings of EW-571:

THROUGH/SWITCH: SWITCH
Other switches: any position



[STEP 1]

Preparation:

- Insert a blank tape (BCT-20MA) into the unit.
- REC mode

Switch heads ① through ④ in order, record to each head in 30 through 60 seconds.

[STEP 2]

1. Insert the tape with recorded at STEP 1 into the standard playback unit.
2. Play back the recorded portion with a standard playback unit. Measure the levels at the following frequencies. The reference level is at 2T BAR portion of 60 % MULTI BURST.
3. When the specification is not satisfied, perform 11-8-1. Y RF Recording Current System Adjustment items 1 through 2 within the specification again.

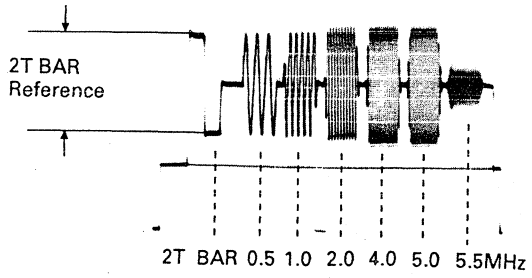
Overall Y Recording Frequency Response Check		Y RF Recording Current System Adjustment
measure low	→	more lower
measure high	→	more higher

Specification: Specification/CH-1 through CH-4

Frequency (MHz)	against measured value of alignment tape (dB)	(%)
2T BAR	0 dB (Reference)	100 % (Reference)
0.5	$^{+0.4}_{-0.5}$ dB	$^{+4.7}_{-5.6}$ %
1.0	$^{+0.4}_{-0.5}$ dB	$^{+4.7}_{-5.6}$ %
2.0	$^{+0.4}_{-0.5}$ dB	$^{+4.7}_{-5.6}$ %
4.0	± 0.5 dB	$^{+5.9}_{-5.6}$ %
5.0	± 1.0 dB	$^{+12.2}_{-10.9}$ %
5.5	± 1.0 dB	$^{+12.2}_{-10.9}$ %

Differerence of among CH-1 through CH-4 should be within 0.4 dB at 5 MHz.

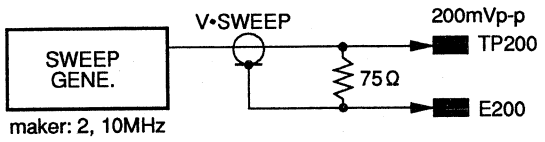
• Measure the levels at the center of moire.



11-8-2. Y RF Recording Current System Adjustment (Using a Waveform Monitor 1780R/1781R)

1. Y Recording Current Frequency Response Adjustment

Equipment: Sweep Generator, Oscilloscope
Preparation:
- Remove the socket SP200 on the VO-46 board.
- Connect TP200 and E200 on the VO-46 board as shown in the following figure.

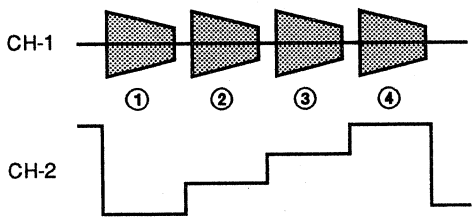


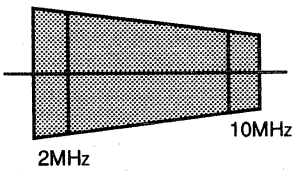
- Insert a blank tape (BCT-20MA) into the unit.
- REC mode

Test point: CH1; TP201(GND:E200)/VO-46 Board
CH2; TP702/VO-46 Board (TRIG)

Adjusting point:
① CV200 (CH-1 FREQ RESP)/VO-46 Board
② CV201 (CH-2 FREQ RESP)/VO-46 Board
③ CV202 (CH-3 FREQ RESP)/VO-46 Board
④ CV203 (CH-4 FREQ RESP)/VO-46 Board

Specification: [for NTSC] 2 MHz : 10 MHz = 100 %(reference) : 75^{+10}_{-8} %
[for PAL] 2 MHz : 10 MHz = 100 %(reference) : 95 ± 10 %





Note:
- After the adjustment, connect the socket SP200 to the original position.

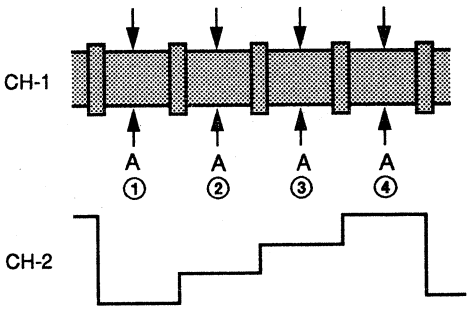
2. Y Recording Current Adjustment

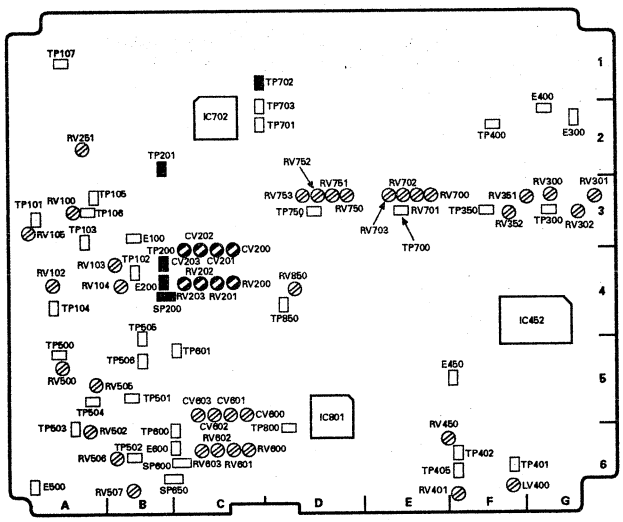
Equipment: Component Signal Generator, Oscilloscope
EW-783 (Camera tool)
Preparation:
- Input signal: 50 % FLAT FIELD
- Insert a blank tape (BCT-20MA) into the unit.
- REC mode

Connection: CONNECTION 2
Test point: CH1; TP201(GND:E200)/VO-46 Board
CH2; TP702/VO-46 Board (TRIG)

Adjusting point:
① RV200 (CH-1 RF Level)/VO-46 Board
② RV201 (CH-2 RF Level)/VO-46 Board
③ RV202 (CH-3 RF Level)/VO-46 Board
④ RV203 (CH-4 RF Level)/VO-46 Board

Specification: A = 1.50 ± 0.05 V p-p



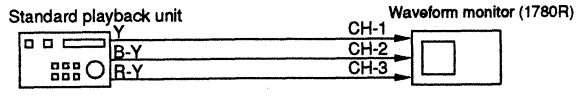


3. Overall Y Recording Frequency Response Check

for NTSC

Equipment: Component Signal Generator, EW-783(Camera Tool), Standard Playback Unit, Waveform Monitor (1780R)
Connection: (REC mode) CONNECTION 2
Test point: Y OUT / Standard playback unit

(PB mode)



[STEP 1]

Preparation:
- Insert a blank tape (BCT-20MA) into the unit.
- REC mode

Record a 60 % MULTI BURST to each head in 30 through 60 seconds.

[STEP 2]

1. Insert the tape with recorded at STEP 1 into the standard playback unit.
2. Play back the recorded portion with a standard playback unit. Measure the levels at the following frequencies. The reference level is at 0.5 MHz portion of 60 % MULTI BURST.
3. When the specification is not satisfied, perform 11-8-2. Y RF Recording Current System Adjustment items 1 through 2 within the specification again.

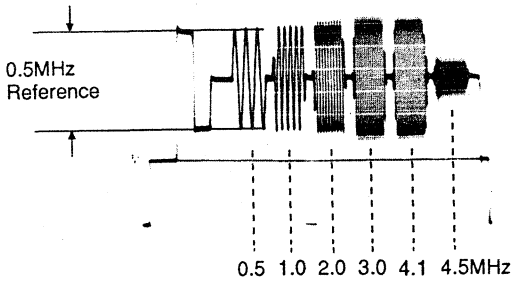
Overall Y Recording Frequency Response Check		Y RF Recording Current System Adjustment
measure low	⟶	more lower
measure high	⟶	more higher

Specification: Specification/CH-1 through CH-4

Frequency (MHz)	against measured value of alignment tape (dB)	(%)
0.5	0 dB (Reference)	100% (Reference)
1.0	± 0.4 dB	$^{+4.7}_{-4.5}$ %
2.0	± 0.4 dB	$^{+4.7}_{-4.5}$ %
3.0	± 0.4 dB	$^{+4.7}_{-4.5}$ %
4.1	± 1.0 dB	$^{+12.2}_{-10.9}$ %
4.5	$^{+1.5}_{-2.0}$ dB	$^{+18.9}_{-20.6}$ %

Differerence of among CH-1 through CH-4 should be within 0.4 dB at 4.1 MHz.

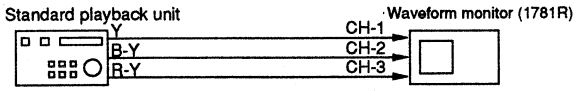
- Measure the levels at the center of moire.



for PAL

Equipment: Component Signal Generator, EW-783(Camera Tool), Standard Playback Unit, Waveform Monitor (1781R)
Connection: (REC mode) CONNECTION 2

(PB mode)



[STEP 1]

Preparation:
- Insert a blank tape (BCT-20MA) into the unit.
- REC mode

Record a 60 % MULTI BURST to each head in 30 through 60 seconds.

[STEP 2]

1. Insert the tape with recorded at STEP 1 into the standard playback unit.
2. Play back the recorded portion with a standard playback unit. Measure the levels at the following frequencies. The reference level is at 2T BAR portion of 60 % MULTI BURST.
3. When the specification is not satisfied, perform 11-8-2. Y RF Recording Current System Adjustment items 1 through 2 within the specification again.

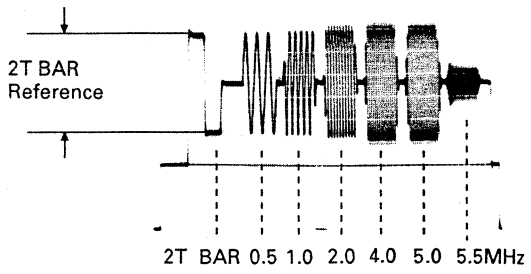
Overall Y Recording Frequency Response Check		Y RF Recording Current System Adjustment
measure low	→	more lower
measure high	→	more higher

Specification: Specification/CH-1 through CH-4

Frequency (MHz)	against measured value of alignment tape (dB)	(%)
2T BAR	0 dB (Reference)	100 % (Reference)
0.5	$^{+0.4}_{-0.5}$ dB	$^{+4.7}_{-5.6}$ %
1.0	$^{+0.4}_{-0.5}$ dB	$^{+4.7}_{-5.6}$ %
2.0	$^{+0.4}_{-0.5}$ dB	$^{+4.7}_{-5.6}$ %
4.0	± 0.5 dB	$^{+5.9}_{-5.6}$ %
5.0	± 1.0 dB	$^{+12.2}_{-10.9}$ %
5.5	± 1.0 dB	$^{+12.2}_{-10.9}$ %

Differerence of among CH-1 through CH-4 should be within 0.4 dB at 1.5 MHz.

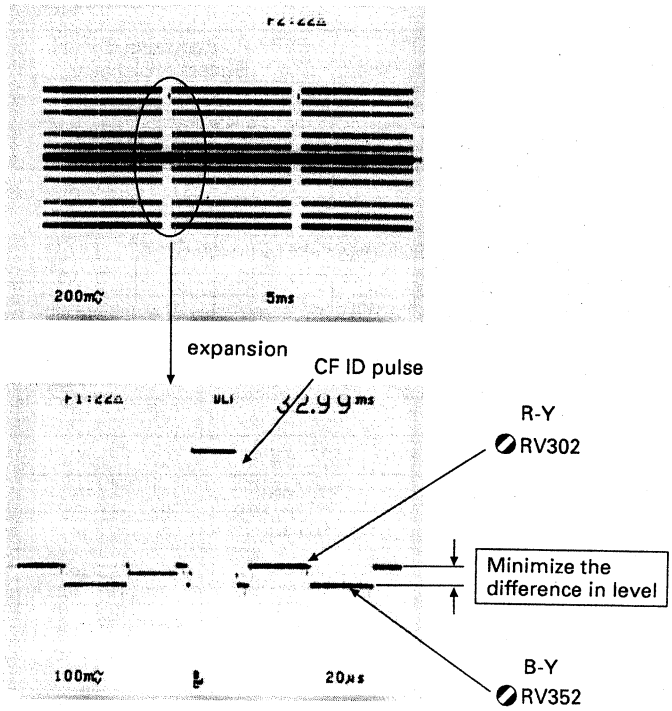
- Measure the levels at the center of moire.



11-9. R-Y, B-Y A/D CLAMP VOLTAGE ADJUSTMENT

Equipment: Component Signal Generator, Oscilloscope
Preparation:
- Input signal: [for NTSC] 75 % COLOR BARS
  [for PAL] 100 % COLOR BARS
- Insert a blank tape (BCT-20MA) into the unit.
- REC mode

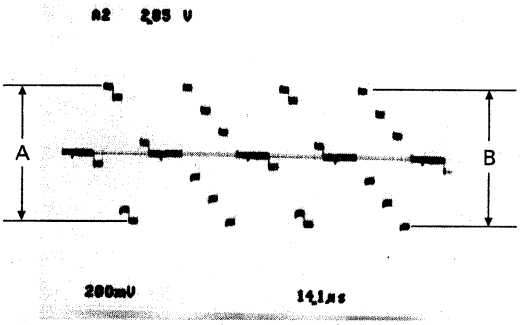
Connection: CONNECTION 2
Test point: TP500/VO-46 Board
TP400/VO-46 Board
Adjusting point:
RV302/VO-46 Board
(R-Y adustment)
RV352/VO-46 Board
(B-Y adjustment)
Specification: Minimize the difference in level.



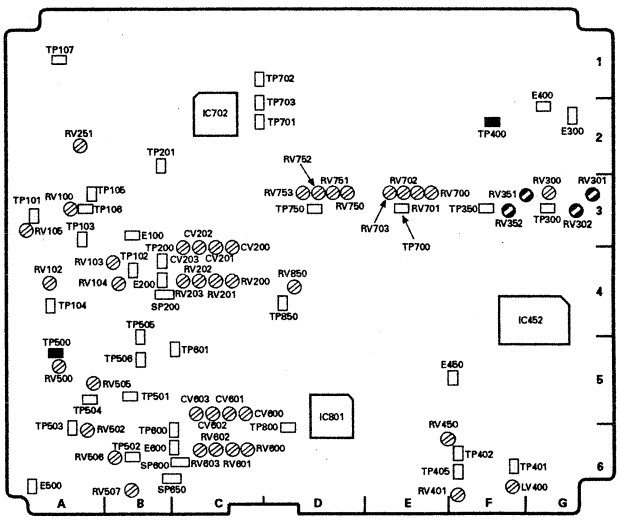
11-10. R-Y, B-Y A/D INPUT LEVEL ADJUSTMENT

Equipment: Component Signal Generator, Oscilloscope
Preparation:
- Input signal: [for NTSC] 75 % COLOR BARS
  [for PAL] 100 % COLOR BARS
- Insert a blank tape (BCT-20MA) into the unit.
- REC mode

Connection: CONNECTION 2
Test point: TP500/VO-46 Board
Trigger: TP400/VO-46 Board
Adjusting point:
RV301/VO-46 Board
(R-Y adustment)
RV351/VO-46 Board
(B-Y adjustment)
Specification: A(R-Y)= 700 ± 10 mV p-p
A(B-Y)= 700 ± 10 mV p-p



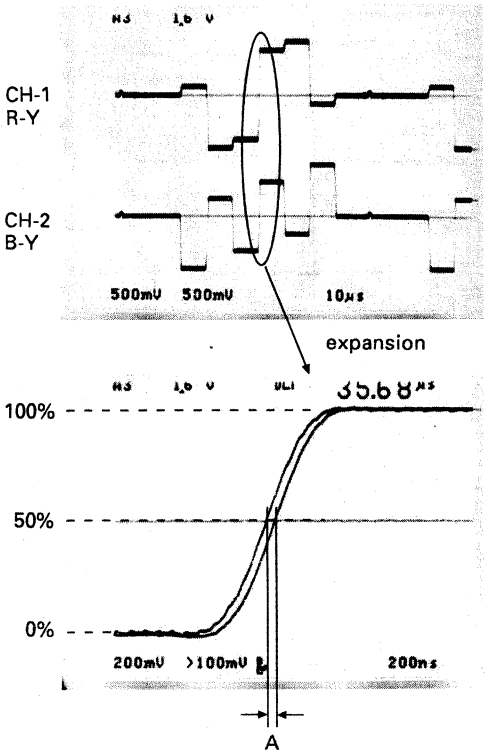
VO-46 BOARD -A SIDE-



11-11. C/C DELAY TENTATIVE ADJUSTMENT
(After this adjustment, perform 11-24. Recording C/C Delay Adjustment.)

Equipment: Component Signal Generator, Oscilloscope
Preparation:
- Input signal: [for NTSC] 75 % COLOR BARS
  [for PAL] 100 % COLOR BARS
- Insert a blank tape (BCT-20MA) into the unit.
- REC mode

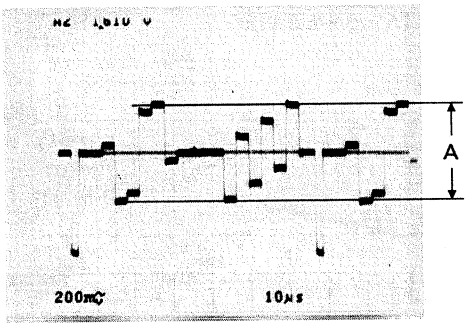
Connection: CONNECTION 2
Test point: CH-1: TP300/VO-46 Board (R-Y)
CH-2: TP350/VO-46 Board (B-Y)
Trigger: TP400/VO-46 Board
Adjusting point: ⊘ RV300/VO-46 Board
Specification: A = 0 ± 5 ns



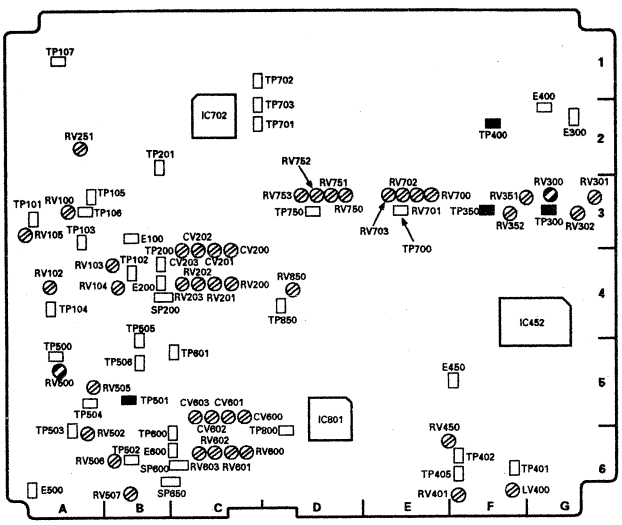
11-12. CTDM LEVEL ADJUSTMENT

Equipment: Component Signal Generator, Oscilloscope
Preparation:
- Input signal: [for NTSC] 75 % COLOR BARS
  [for PAL] 100 % COLOR BARS
- Insert a blank tape (BCT-20MA) into the unit.
- REC mode

Connection: CONNECTION 2
Test point: TP501/VO-46 Board
Trigger: TP400/VO-46 Board
Adjusting point: ⊘ RV500/VO-46 Board
Specification: [for NTSC] A=500 ± 10mV
[for PAL] A=667 ± 10mV



VO-46 BOARD -A SIDE-

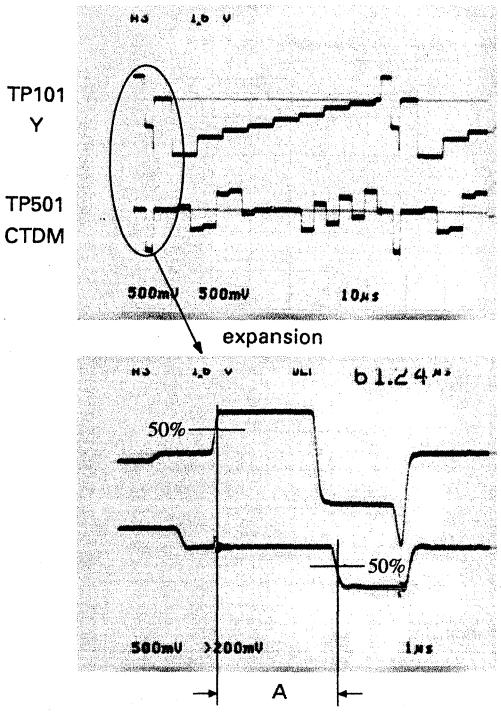


11-13. C REF SYNC POSITION TENTATIVE ADJUSTMENT (After this adjustment, perform 11-24. Recording C/C Delay Adjustment.)

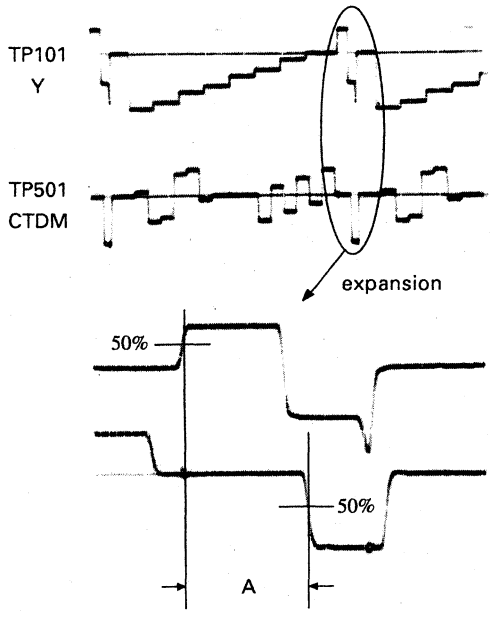
Equipment: Component Signal Generator, Oscilloscope
Preparation:
- Input signal: [for NTSC] 75 % COLOR BARS
  [for PAL] 100 % COLOR BARS
- Insert a blank tape (BCT-20MA) into the unit.
- REC mode

Connection: CONNECTION 2
Test point: CH-1: TP101/VO-46 Board (Y)
CH-2: TP501/VO-46 Board (CTDM)
Trigger: TP400/VO-46 Board
Adjusting point: ⊘RV450/VO-46 Board
Specification: A = 3.2 ± 0.1 µs

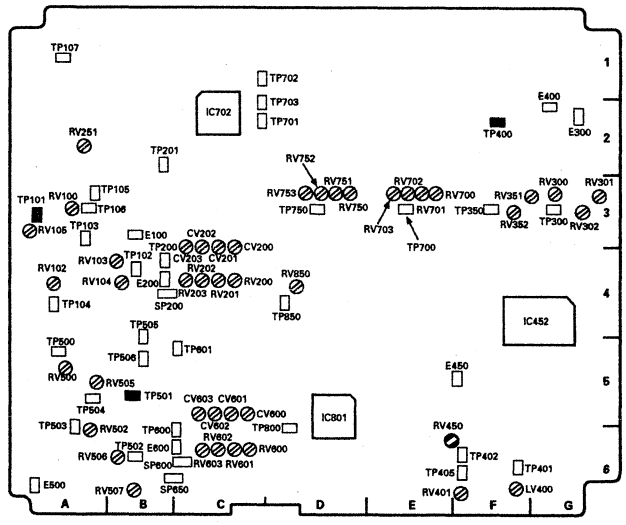
for NTSC



for PAL



VO-46 BOARD -A SIDE-

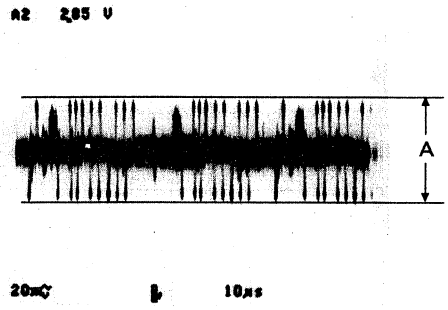


11-14. C NONLINEAR PRE-EMPHASIS MIX LEVEL ADJUSTMENT

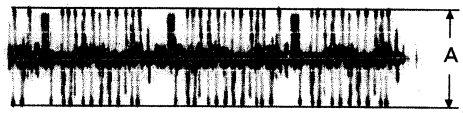
Equipment: Component Signal Generator, Oscilloscope
Preparation:
- Input signal: PULSE & BAR (2,4 T)
- Insert a blank tape (BCT-20MA) into the unit.
- REC mode

Connection: CONNECTION 2
Test point: TP503/VO-46 Board
Trigger: TP400/VO-46 Board
Adjusting point: RV502/VO-46 Board
Specification: A=75 ± 5mV

for NTSC



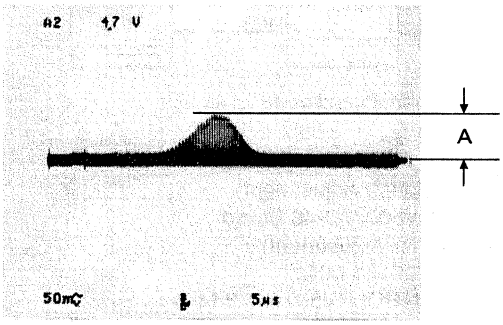
for PAL



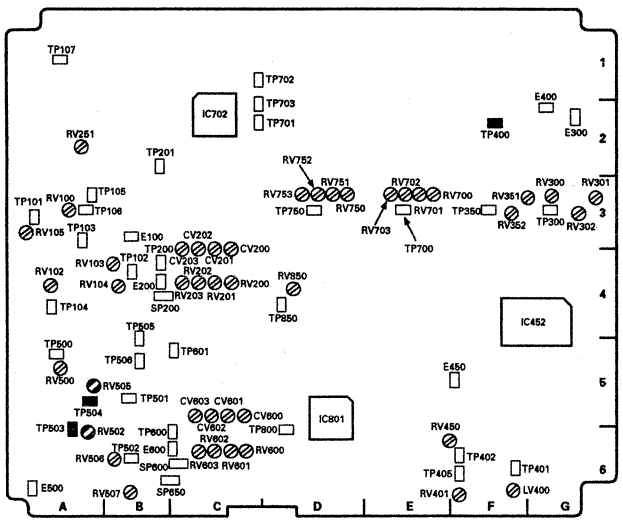
11-15. C REC HF ADJUSTMENT

Equipment: Component Signal Generator, Oscilloscope
Preparation:
- Input singnal: 100% NALLOW LINE SWEEP
- Insert a blank tape (BCT-20MA) into the unit.
- REC mode

Connection: CONNECTION 2
Test point: TP504/VO-46 Board
Trigger: TP400/VO-46 Board
Adjusting point: RV505/VO-46 Board
Specification: [for NTSC] A=60 ± 5mV
[for PAL] A=100 ± 5mV



VO-46 BOARD -A SIDE-



11-16. C CARRIER / DEVIATION ADJUSTMENT

11-16-1. C Carrier / Deviation Adjustment (Using a Spectrum analyzer)

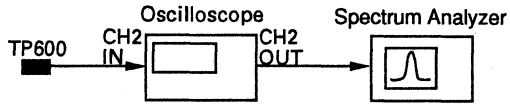
Equipment: Spectrum Analyzer, Component Signal Generator, Oscilloscope

Preparation:

- Input signal: [for NTSC] 75 % COLOR BARS
  [for PAL] 100 % COLOR BARS
- Insert a blank tape (BCT-20MA) into the unit.
- REC mode

Connection: CONNECTION 2

Spectrum analyzer connection



Test point: TP600/VO-46 Board

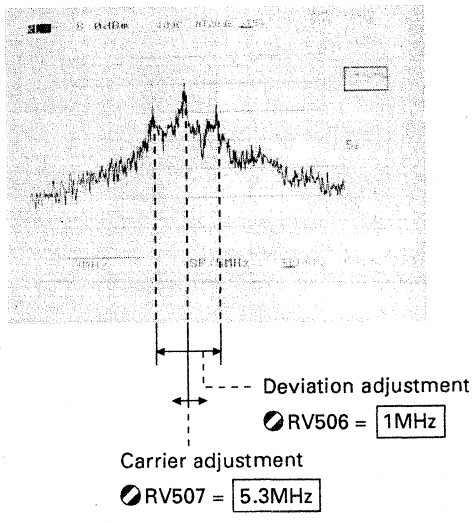
Adjusting point:

RV506/VO-46 Board
(Deviation Adjustment)
RV507/VO-46 Board
(Carrier Adjustment)

Specification: RV506 = 1 MHz
[for NTSC] RV507 = 5.3 MHz
[for PAL] RV507 = 6.1 MHz

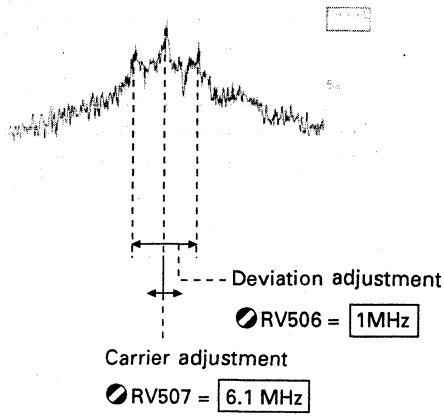
Spectrum analyzer waveform

for NTSC

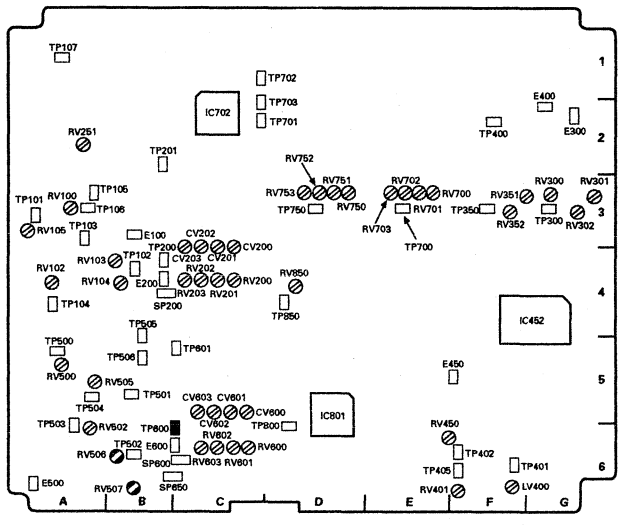


Spectrum analyzer waveform

for PAL



VO-46 BOARD -A SIDE-



11-16-2. C Carrier / Deviation Adjustment (Using a Deviation checker)

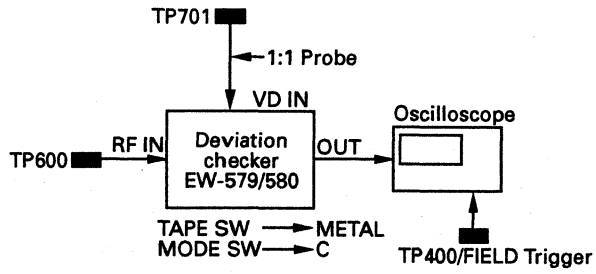
Equipment: Deviation Checker, Component Signal Generator, Oscilloscope

Preparation:

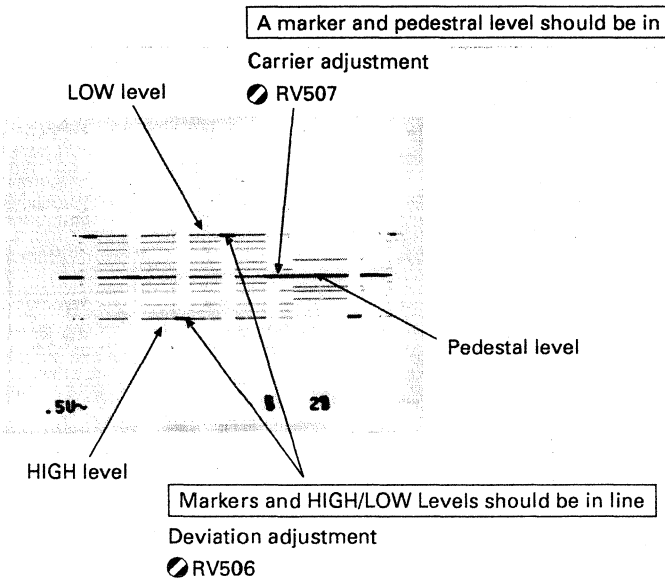
- Input signal: [for NTSC] 75 % COLOR BARS
  [for PAL] 100 % COLOR BARS
- Insert a blank tape (BCT-20MA) into the unit.
- REC mode

Connection: CONNECTION 2

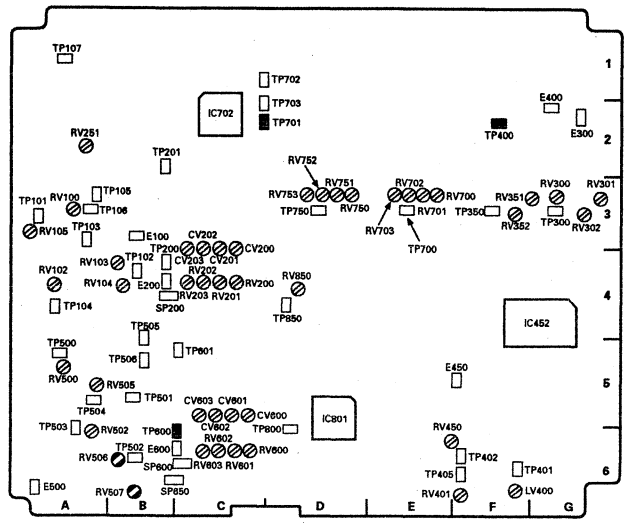
Deviation checker connection



Test point: TP600/VO-46 Board
Trigger: TP400/VO-46 Board
Adjusting point:
RV506/VO-46 Board
(Deviation adjustment)
RV507/VO-46 Board
(Carrier adjustment)
Specification: RV506: Markers and HIGH/LOW levels should be in line.
RV507: A marker and pedestal level should be in line.



VO-46 BOARD -A SIDE-

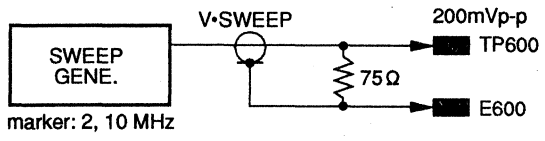


11-17. C RF RECORDING CURRENT SYSTEM ADJUSTMENT

11-17-1.C RF Recording Current System Adjustment (Using a Recording current adjustment tool EW-571)

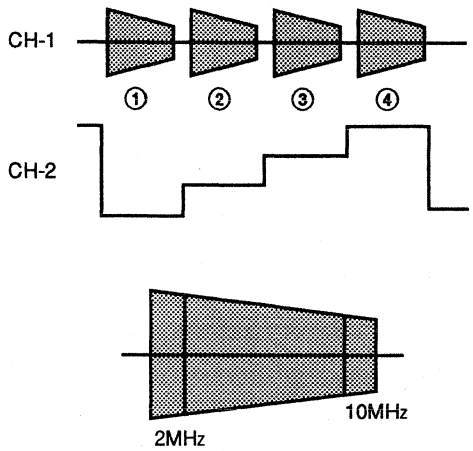
1. C Recording Current Frequency Response Adjustment

Equipment: Sweep Generator, Oscilloscope
Preparation:
- Remove the socket SP600 on the VO-46 board.
- Connect TP600 and E600 on the VO-46 board as shown in the following figure.



- Insert a blank tape (BCT-20MA) into the unit.
- REC mode

Test point: CH1; TP601(GND:E600)/VO-46 Board
CH2; TP702/VO-46 Board (TRIG)
Adjusting point:
① CV600 (CH-1 FREQ RESP)/VO-46 Board
② CV601 (CH-2 FREQ RESP)/VO-46 Board
③ CV602 (CH-3 FREQ RESP)/VO-46 Board
④ CV603 (CH-4 FREQ RESP)/VO-46 Board
Specification: [for NTSC] 2 MHz : 10 MHz = 100 %(reference) : 65^{+10}_{-5} %
[for PAL] 2 MHz : 10 MHz = 100 %(reference) : 85 ± 10 %

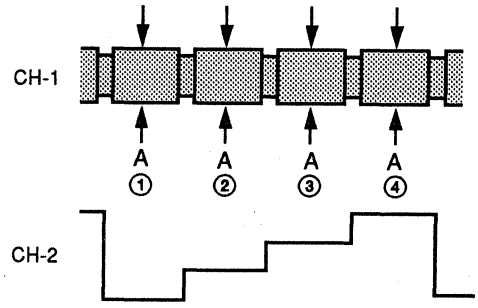


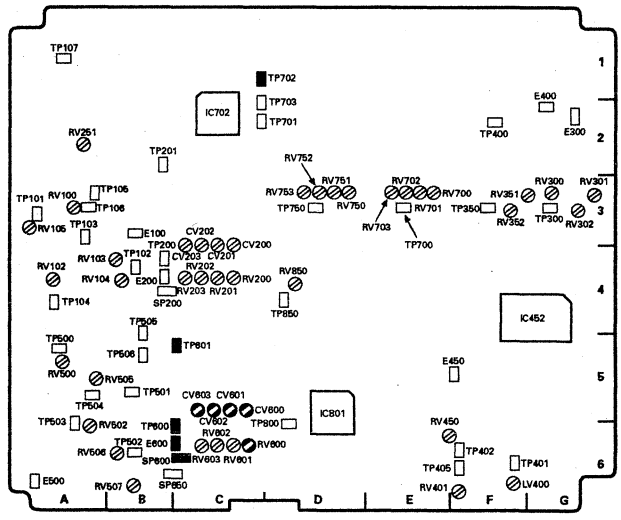
Note:
- After the adjustment, connect the socket SP600 to the original position.

2. C Recording Current Adjustment

Equipment: Component Signal Generator, Oscilloscope
EW-783 (Camera tool)
Preparation:
- Input signal: 50 % FLAT FIELD
- Insert a blank tape (BCT-20MA) into the unit.
- REC mode

Connection: CONNECTION 2
Test point: CH1; TP601(GND:E600)/VO-46 Board
CH2; TP702/VO-46 Board (TRIG)
Adjusting point:
① RV600 (CH-1 RF Level)/VO-46 Board
② RV601 (CH-2 RF Level)/VO-46 Board
③ RV602 (CH-3 RF Level)/VO-46 Board
④ RV603 (CH-4 RF Level)/VO-46 Board
Specification: A = 0.9 ± 0.05 V p-p





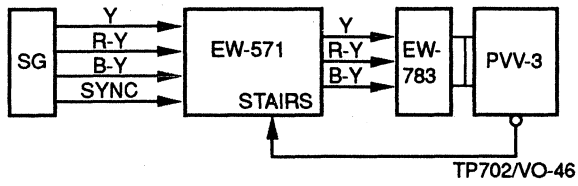
3. Overall C Recording Frequency Response Check

for NTSC

Equipment: Component Signal Generator, EW-571(Recording Current Adjustment Tool), EW-783(Camera Tool), Standard Playback Unit, Waveform Monitor(WFM300/300A)

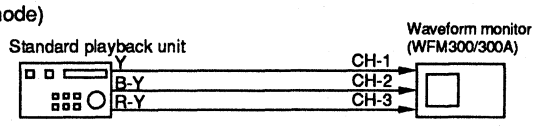
Connection:

(REC mode)
• input signal: 60% MULTI BURST



Switch settings of EW-571:
THROUGH/SWITCH: SWITCH
Other switches: any position

(PB mode)



[STEP 1]

Preparation:
- Insert a blank tape (BCT-20MA) into the unit.
- REC mode

Switch heads ① through ④ in order, record to each head in 30 through 60 seconds.

[STEP 2]

1. Insert the tape with recorded at STEP 1 into the standard playback unit.
2. Play back the recorded portion with a standard playback unit. Measure the levels at the following frequencies. The reference level is at 0.2 MHz portion of 60 % MULTI BURST.
3. When the specification is not satisfied, perform 11-17-1. C RF Recording Current System Adjustment items 1 through 2 within the specification again.

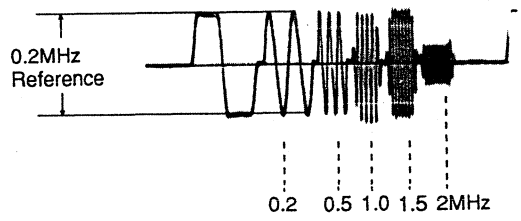
Overall C Recording Frequency Response Check		C RF Recording Current System Adjustment
measure low	→	more lower
measure high	→	more higher

Specification: Specification/CH-1 through CH-4

Frequency (MHz)	against measured value of alignment tape (dB)	(%)
0.2	0 dB (Reference)	100% (Reference)
0.5	± 0.4 dB	$^{+4.7}_{-4.5}$ %
1.0	± 0.4 dB	$^{+4.7}_{-4.5}$ %
1.5	± 1.5 dB	$^{+18.9}_{-15.9}$ %

Differerence of among CH-1 through CH-4 should be within 0.4 dB at 1.5 MHz.

• Measure the levels at the center of moire.



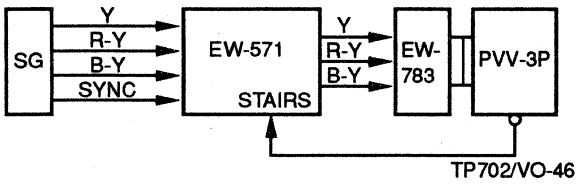
for PAL

Equipment: Component Signal Generator, EW-571(Recording Current Adjustment Tool), EW-783(Camera Tool), Standard Playback Unit, Waveform Monitor(WFM300/300A)

Connection:

(REC mode)

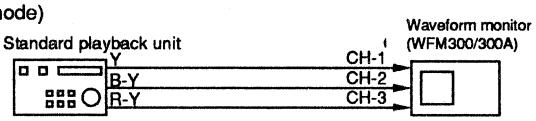
• input signal: 60% MULTI BURST



Switch settings of EW-571:

THROUGH/SWITCH: SWITCH
Other switches: any position

(PB mode)



[STEP 1]

Preparation:

- Insert a blank tape (BCT-20MA) into the unit.
- REC mode

Switch heads ① through ④ in order, record to each head in 30 through 60 seconds.

[STEP 2]

1. Insert the tape with recorded at STEP 1 into the standard playback unit.
2. Play back the recorded portion with a standard playback unit. Measure the levels at the following frequencies. The reference level is at 8T BAR portion of 60 % MULTI BURST.
3. When the specification is not satisfied, perform 11-17-1. C RF Recording Current System Adjustment items 1 through 2 within the specification again.

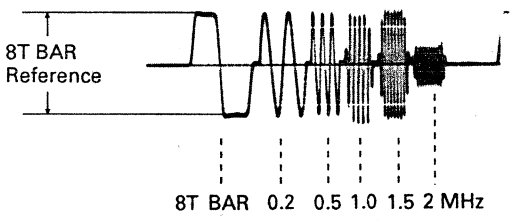
Overall C Recording Frequency Response Check		C RF Recording Current System Adjustment
measure low	⟶	more lower
measure high	⟶	more higher

Specification: Specification/CH-1 through CH-4

Frequency (MHz)	against measured value of alignment tape (dB)	(%)
8T BAR	0 dB (Reference)	100% (Reference)
0.2	$^{+0.4}_{-1.0}$ dB	$^{+4.7}_{-10.9}$ %
0.5	$^{+0.4}_{-1.0}$ dB	$^{+4.7}_{-10.9}$ %
1.0	$^{+0.4}_{-1.0}$ dB	$^{+4.7}_{-10.9}$ %
1.5	$^{+0.4}_{-1.5}$ dB	$^{+4.7}_{-15.9}$ %
2.0	±1.5 dB	$^{+18.9}_{-15.9}$ %

Differerence of among CH-1 through CH-4 should be within 0.4 dB at 1.5 MHz.

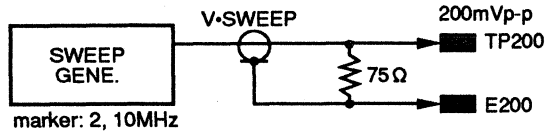
- Measure the levels at the center of moire.



11-17-2. C RF Recording Current System Adjustment (Using a Waveform Monitor 1780R/1781R)

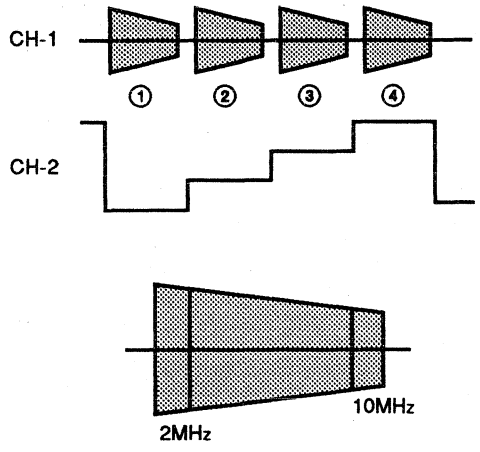
1. C Recording Current Frequency Response Adjustment

Equipment: Sweep Generator, Oscilloscope
Preparation:
- Remove the socket SP600 on the VO-46 board.
- Connect TP600 and E600 on the VO-46 board as shown in the following figure.



- Insert a blank tape (BCT-20MA) into the unit.
- REC mode

Test point: CH1; TP601(GND:E600)/VO-46 Board
CH2; TP702/VO-46 Board (TRIG)
Adjusting point:
① CV600 (CH-1 FREQ RESP)/VO-46 Board
② CV601 (CH-2 FREQ RESP)/VO-46 Board
③ CV602 (CH-3 FREQ RESP)/VO-46 Board
④ CV603 (CH-4 FREQ RESP)/VO-46 Board
Specification: [for NTSC] 2 MHz : 10 MHz = 100 %(reference) : 65^{+10}_{-5} %
[for PAL] 2 MHz : 10 MHz = 100 %(reference) : 85 ± 10 %

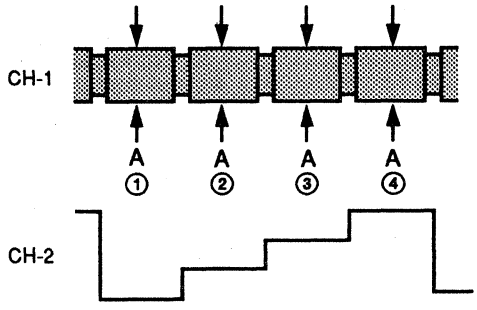


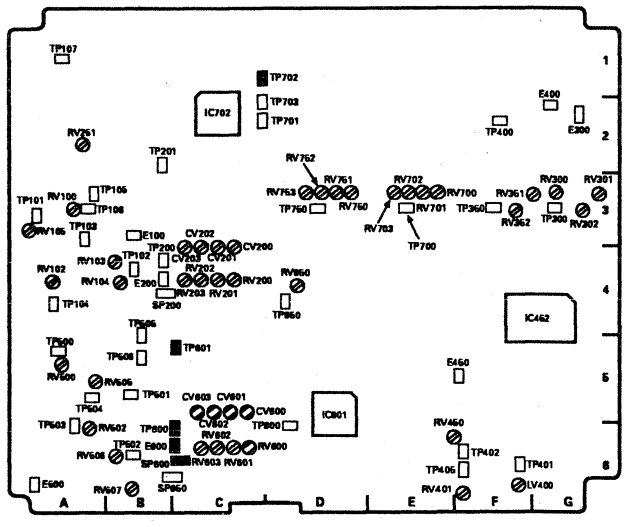
Note:
- After the adjustment, connect the socket SP600 to the original position.

2. C Recording Current Adjustment

Equipment: Component Signal Generator, Oscilloscope
EW-783(Camera Tool)
Preparation:
- Input signal: 50 % FLAT FIELD
- Insert a blank tape (BCT-20MA) into the unit.
- REC mode

Connection: CONNECTION 2
Testn point: CH-1; TP601(GND, E600)/VO-46 Board
CH-2; TP702/VO-46 Board(TRIG)
Adjusting point:
① RV600 (CH-1 RF Level)/VO-46 Board
② RV601 (CH-2 RF Level)/VO-46 Board
③ RV602 (CH-3 RF Level)/VO-46 Board
④ RV603 (CH-4 RF Level)/VO-46 Board
Specification: A = 0.9 ± 0.05 V p-p



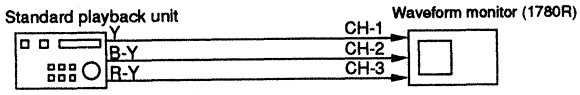


3. Overall C Recording Frequency Response Check

for NTSC

Equipment: Component Signal Generator, EW-783(Camera Tool), Standard Playback Unit, Waveform Monitor (1780R)
Connection: (REC mode) CONNECTION 2

(PB mode)



[STEP 1]

Preparation:
- Insert a blank tape (BCT-20MA) into the unit.
- REC mode

Record a 60 % MULTI BURST to each head in 30 through 60 seconds.

[STEP 2]

1. Insert the tape with recorded at STEP 1 into the standard playback unit.
2. Play back the recorded portion with a standard playback unit. Measure the levels at the following frequencies. The reference level is at 0.2 MHz portion of 60 % MULTI BURST.
3. When the specification is not satisfied, perform 11-17-2. C RF Recording Current System Adjustment items 1 through 2 within the specification again.

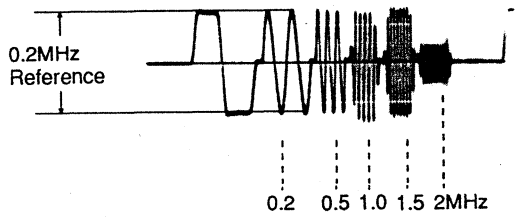
Overall C Recording Frequency Response Check		C RF Recording Current System Adjustment
measure low	→	more lower
measure high	→	more higher

Specification: Specification/CH-1 through CH-4

Frequency (MHz)	against measured value of alignment tape (dB)	(%)
0.2	0 dB (Reference)	100% (Reference)
0.5	± 0.4 dB	$^{+4.7}_{-4.5}$ %
1.0	± 0.4 dB	$^{+4.7}_{-4.5}$ %
1.5	± 1.5 dB	$^{+18.9}_{-15.9}$ %

Differerence of among CH-1 through CH-4 should be within 0.4 dB at 1.5 MHz.

- Measure the levels at the center of moire.

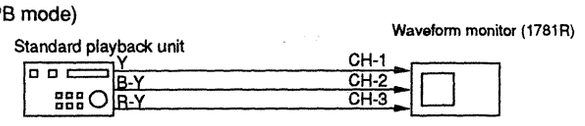


for PAL

Equipment: Component Signal Generator, EW-783(Camera Tool), Standard Playback Unit, Waveform Monitor (1781R)

Connection: (REC mode) CONNECTION 2

(PB mode)



[STEP 1]

Preparation:
- Insert a blank tape (BCT-20MA) into the unit.
- REC mode

Record a 60 % MULTI BURST to each head in 30 through 60 seconds.

[STEP 2]

1. Insert the tape with recorded at STEP 1 into the standard playback unit.
2. Play back the recorded portion with a standard playback unit. Measure the levels at the following frequencies. The reference level is at 8T BAR portion of 60 % MULTI BURST.
3. When the specification is not satisfied, perform 11-17-2. C RF Recording Current System Adjustment items 1 through 2 within the specification again.

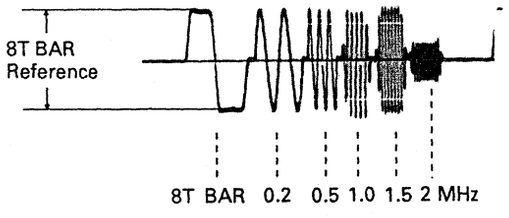
Overall C Recording Frequency Response Check		C RF Recording Current System Adjustment
measure low	→	more lower
measure high	→	more higher

Specification: Specification/CH-1 through CH-4

Frequency (MHz)	against measured value of alignment tape (dB)	(%)
8T BAR	0 dB (Reference)	100% (Reference)
0.2	$^{+0.4}_{-1.0}$ dB	$^{+4.7}_{-10.9}$ %
0.5	$^{+0.4}_{-1.0}$ dB	$^{+4.7}_{-10.9}$ %
1.0	$^{+0.4}_{-1.0}$ dB	$^{+4.7}_{-10.9}$ %
1.5	$^{+0.4}_{-1.5}$ dB	$^{+4.7}_{-15.9}$ %
2.0	±1.5 dB	$^{+18.9}_{-15.9}$ %

Differerence of among CH-1 through CH-4 should be within 0.4 dB at 1.5 MHz.

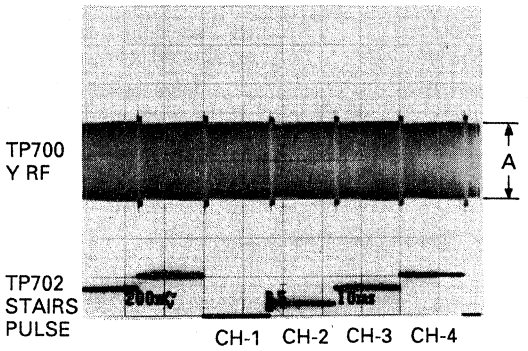
- Measure the levels at the center of moire.



11-18. Y RF LEVEL ADJUSTMENT

Equipment: Oscilloscope
Preparation:
- Insert an alignment tape (CR5-1B or CR5-1B PS) into the unit, and playback the FLAT FIELD portion (24:00-26:00).

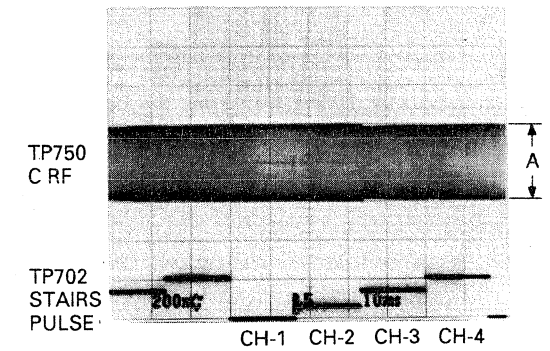
Test point: TP700/VO-46 Board
Trigger: TP702/VO-46 Board
Adjusting point:
CH-1 RV700/VO-46 Board
CH-2 RV701/VO-46 Board
CH-3 RV702/VO-46 Board
CH-4 RV703/VO-46 Board
Specification: A = 400 ± 20 mV



11-19. C RF LEVEL ADJUSTMENT

Equipment: Oscilloscope
Preparation:
- Insert an alignment tape (CR5-1B or CR5-1B PS) into the unit, and playback the FLAT FIELD portion (24:00-26:00).

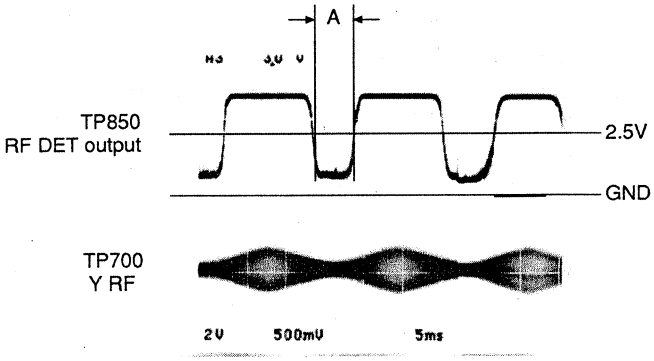
Test point: TP750/VO-46 Board
Trigger: TP702/VO-46 Board
Adjusting point:
CH-1 RV750/VO-46 Board
CH-2 RV751/VO-46 Board
CH-3 RV752/VO-46 Board
CH-4 RV753/VO-46 Board
Specification: A = 400 ± 20 mV p-p



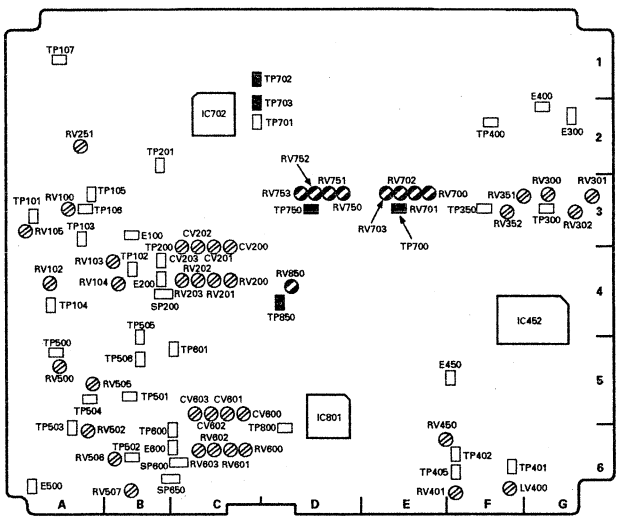
11-20. RF ALARM ADJUSTMENT

Equipment: Component Signal Generator, Oscilloscope
Preparation:
- Input signal: 50 % FLAT FIELD
- Insert a blank tape (BCT-20MA) into the unit.
- Put the unit into PLAY mode for a few seconds, and put the unit into PLAY PAUSE mode. Then turn the following control knob.

Connection: CONNECTION 2
Test point: CH-1:TP850/VO-46 Board
CH-2:TP700/VO-46 Board
Trigger: TP703/VO-46 Board
Adjusting point: RV850/VO-46 Board
Specification: A = 5 ± 1 ms



VO-46 BOARD -A SIDE-



PVV-3 (UC)
PVV-3P (EK)

11-21. OVERALL Y RECORDING FREQUENCY RESPONSE CHECK

For more accurate measuring, it is recommended to use a VM-700(Tektronix).

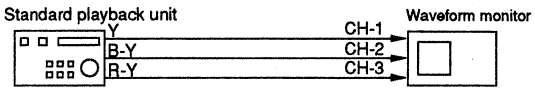
for NTSC

Equipment: Component Signal Generator, Oscilloscope or Waveform Monitor

Preparation:
- Input signal: 60 % MULTI BURST
- Insert a blank tape (BCT-20MA) into the unit.
- Alignment tape (CR5-1B)

Connection: CONNECTION 2

Waveform monitor connection



Test point: Y OUT / Standard playback unit
Trigger: REF VIDEO OUT / Standard playback unit

Adjustment procedure
1. Put the unit into REC mode for about 30 seconds.
2. Play back the recorded portion with a standard playback unit. Measure the levels at the following frequencies. The reference level is at 0.5 MHz portion of 60 % MULTI BURST.
3. When the specification is not satisfied, perform 11-8. Y RF Recording System Adjustment within the specification again.

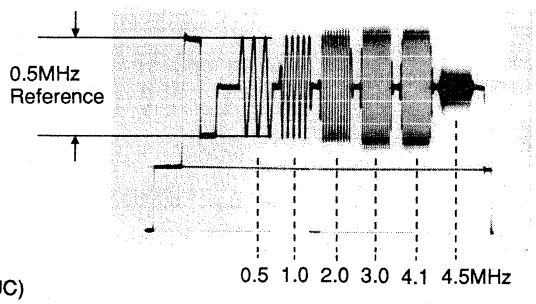
Overall Y Recording Frequency Response Check		Y RF Recording Current System Adjustment
measure low	→	more lower
measure high	→	more higher

Specification:

Specification/CH-1 through CH-4

Frequency (MHz)	against measured value of alignment tape (dB)	(%)
0.5	0 dB (Reference)	100% (Reference)
1.0	± 0.4 dB	$^{+4.7}_{-4.5}$ %
2.0	± 0.4 dB	$^{+4.7}_{-4.5}$ %
3.0	± 0.4 dB	$^{+4.7}_{-4.5}$ %
4.1	± 1.0 dB	$^{+12.2}_{-10.9}$ %
4.5	$^{+1.5}_{-2.0}$ dB	$^{+18.9}_{-20.6}$ %

- Measure the levels at the center of moire.



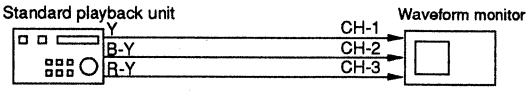
for PAL

Equipment: Component Signal Generator, Oscilloscope or Waveform Monitor

Preparation:
- Input signal: 60 % MULTI BURST
- Insert a blank tape (BCT-20MA) into the unit.
- Alignment tape (CR5-1B PS)

Connection: CONNECTION 2

Waveform monitor connection



Test point: Y OUT / Standard playback unit
Trigger: REF VIDEO OUT / Standard playback unit

Adjustment procedure
1. Put the unit into REC mode for about 30 seconds.
2. Play back the recorded portion with a standard playback unit. Measure the levels at the following frequencies. The reference level is at 2T BAR portion of 60 % MULTI BURST.
3. When the specification is not satisfied, perform 11-8. Y RF Recording System Adjustment within the specification again.

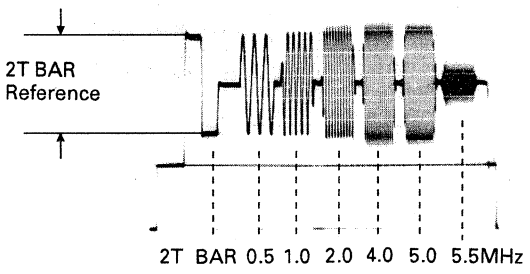
Overall Y Recording Frequency Response Check		Y RF Recording Current System Adjustment
measure low	→	more lower
measure high	→	more higher

Specification:

Specification/CH-1 through CH-4

Frequency (MHz)	against measured value of alignment tape (dB)	(%)
2T BAR	0 dB (Reference)	100 % (Reference)
0.5	$^{+0.4}_{-0.5}$ dB	$^{+4.7}_{-5.6}$ %
1.0	$^{+0.4}_{-0.5}$ dB	$^{+4.7}_{-5.6}$ %
2.0	$^{+0.4}_{-0.5}$ dB	$^{+4.7}_{-5.6}$ %
4.0	± 0.5 dB	$^{+5.9}_{-5.6}$ %
5.0	± 1.0 dB	$^{+12.2}_{-10.9}$ %
5.5	± 1.0 dB	$^{+12.2}_{-10.9}$ %

- Measure the levels at the center of moire.



11-22. OVERALL C RECORDING FREQUENCY RESPONSE CHECK

For more accurate measuring, it is recommended to use a VM-700(Tektronix).

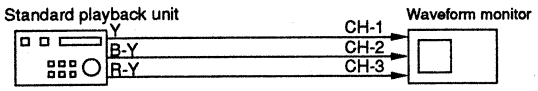
for NTSC

Equipment: Component Signal Generator, Oscilloscope or Waveform Monitor

Preparation:
- Input signal: 60 % MULTI BURST
- Insert a blank tape (BCT-20MA) into the unit.
- Alignment tape (CR5-1B)

Connection: CONNECTION 2

Waveform monitor connection



Test point: R-Y, B-Y OUT / Standard playback unit
Trigger: REF VIDEO OUT / Standard playback unit

Adjustment procedure
1. Put the unit into REC mode for about 30 seconds.
2. Play back the recorded portion with a standard playback unit. Measure the levels at the following frequencies. The reference level is at 0.2 MHz portion of 60 % MULTI BURST.
3. When the specification is not satisfied, perform 11-17. C RF Recording System Adjustment within the specification again.

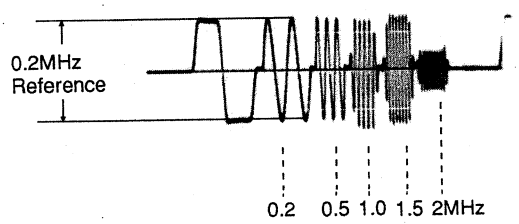
Overall Y Recording Frequency Response Check	C RF Recording Current System Adjustment
measure low	⟶ more lower
measure high	⟶ more higher

Specification:

Specification/CH-1 through CH-4

Frequency (MHz)	against measured value of alignment tape (dB)	(%)
0.2	0 dB (Reference)	100% (Reference)
0.5	± 0.4 dB	$^{+4.7}_{-4.5}$ %
1.0	± 0.4 dB	$^{+4.7}_{-4.5}$ %
1.5	± 1.5 dB	$^{+18.9}_{-15.9}$ %

- Measure the levels at the center of moire.



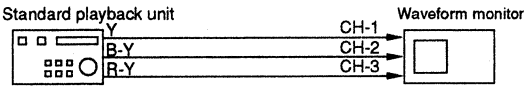
for PAL

Equipment: Component Signal Generator, Oscilloscope or Waveform Monitor

Preparation:
- Input signal: 60 % MULTI BURST
- Insert a blank tape (BCT-20MA) into the unit.
- Alignment tape (CR5-1B PS)

Connection: CONNECTION 2

Waveform monitor connection



Test point: R-Y, B-Y OUT / Standard playback unit
Trigger: REF VIDEO OUT / Standard playback unit

Adjustment procedure
1. Put the unit into REC mode for about 30 seconds.
2. Play back the recorded portion with a standard playback unit. Measure the levels at the following frequencies. The reference level is at 2T BAR portion of 60 % MULTI BURST.
3. When the specification is not satisfied, perform 11-17. C RF Recording System Adjustment within the specification again.

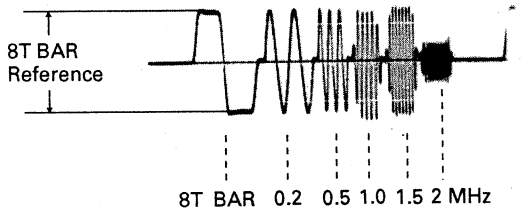
Overall Y Recording Frequency Response Check	C RF Recording Current System Adjustment
measure low	⟶ more lower
measure high	⟶ more higher

Specification:

Specification/CH-1 through CH-4

Frequency (MHz)	against measured value of alignment tape (dB)	(%)
8T BAR	0 dB (Reference)	100% (Reference)
0.2	$^{+0.4}_{-1.0}$ dB	$^{+4.7}_{-10.9}$ %
0.5	$^{+0.4}_{-1.0}$ dB	$^{+4.7}_{-10.9}$ %
1.0	$^{+0.4}_{-1.0}$ dB	$^{+4.7}_{-10.9}$ %
1.5	$^{+0.4}_{-1.5}$ dB	$^{+4.7}_{-15.9}$ %
2.0	±1.5 dB	$^{+18.9}_{-15.9}$ %

- Measure the levels at the center of moire.



11-23. RECORDING Y/C DELAY ADJUSTMENT

Use a standard playback unit which the Play Back Y/C Delay and Play Back C/C Delay are adjusted by the alignment tape (CR5-1B or CR5-1B PS).

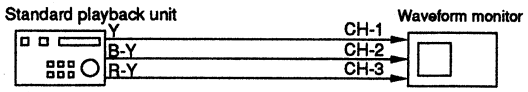
Equipment: Component Signal Generator, Oscilloscope, Waveform Monitor

Preparation:

- Input signal: BOWTIE
- Insert a blank tape (BCT-20MA) into the unit.

Connection: CONNECTION 2

Waveform Monitor connection



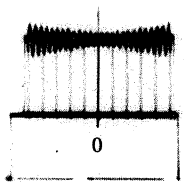
Test point: Y, R-Y, B-Y OUT / Standard playback unit
Trigger: REF VIDEO OUT / Standard playback unit

Adjustment procedure

1. Insert a blank tape(BCT-20MA) into the unit, and put the unit into REC mode for about 30 seconds.
2. Play back the recorded portion with a standard playback unit, and measure the Y/C delay.
3. Specification: Y/C delay = 0 ± 28 ns

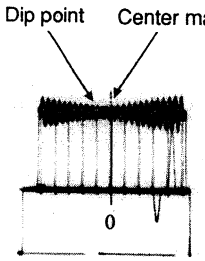
Component Waveform Monitor

BOWTIE mode --- (CH-1,CH-2)

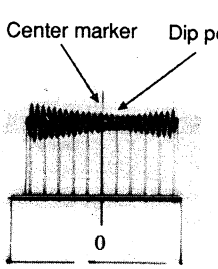


Y/C delay = Difference of center marker and dip point
(1 graduation = 20 ns)

C advances



C delays



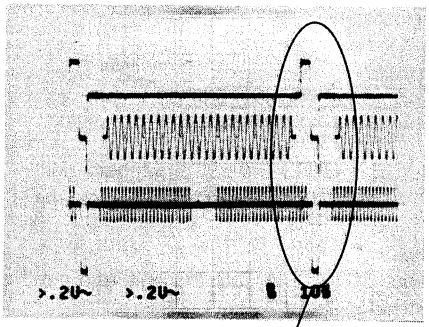
When the specification is not satisfied
Adjust ◐RV450 (C REF SYNC position) in REC mode.
After the adjustment, check adjustment procedure 1 to 3 again.

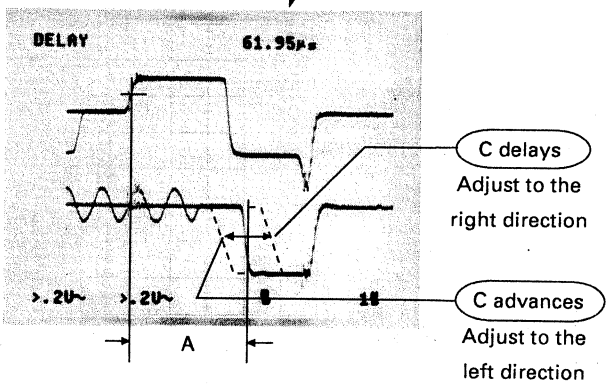
Preparation:

- Input signal: BOWTIE
- Insert a blank tape (BCT-20MA) into the unit.

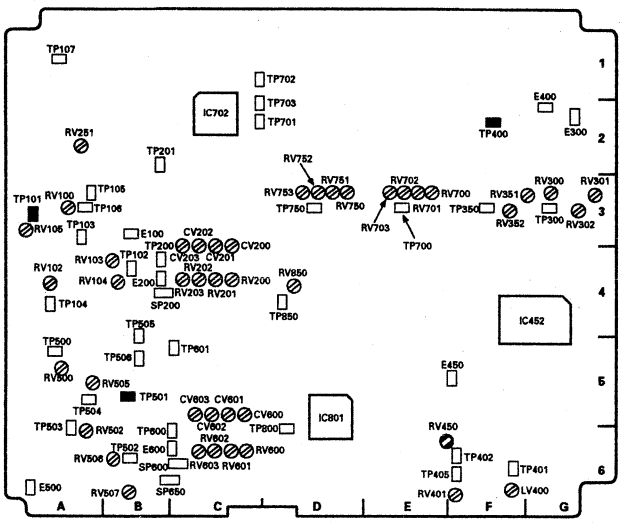
Connection: CONNECTION 2
Test point: CH-1:TP101/VO-46 Board (Y)
CH-2:TP501/VO-46 Board (CTDM)
Trigger: TP400/VO-46 Board
Adjusting point: ◐RV450/VO-46 Board
Specification: A = 3.2 ± 0.1 µs

Oscilloscope





VO-46 BOARD -A SIDE-



11-24. RECORDING C/C DELAY ADJUSTMENT

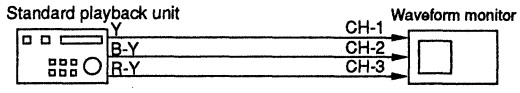
Use a standard playback unit which the Play Back Y/C Delay and Play Back C/C Delay are adjusted by the alignment tape (CR5-1B or CR5-1B PS).

Equipment: Component Siganl Generator, Oscilloscope, Waveform Monitor

Preparation:
- Input signal: BOWTIE
- Insert a blank tape (BCT-20MA) into the unit.

Connection: CONNECTION 2

Waveform monitor connection

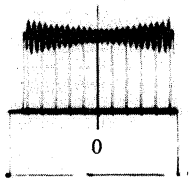


Test point: Y, R-Y, B-Y OUT / Standard playback unit
Trigger: REF VIDEO OUT / Standard playback unit

Adjustment procedure
1. Insert a blank tape (BCT-20MA) into the unit, and put the unit into REC mode for about 30 seconds.
2. Play back the recorded portion with a standard playback unit, and measure the C/C delay.
3. Specification: C/C delay = 0 ± 28 ns

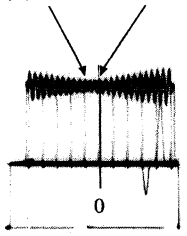
Component Waveform Monitor

BOWTIE mode --- (CH-1,CH-3)

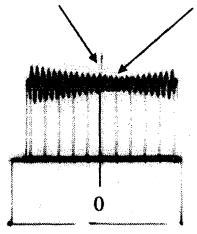


C/C delay = Difference of center marker and dip point
(1 graduation = 20 ns)

R-Y advances



R-Y delays

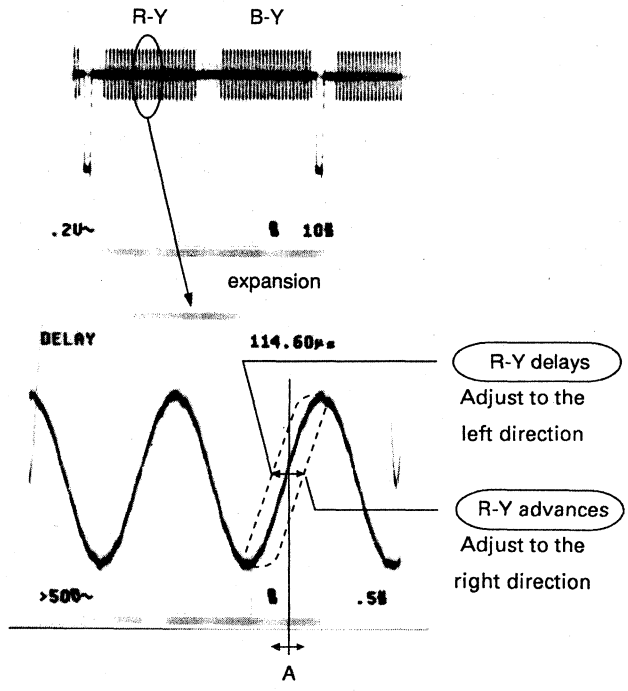


When the specification is not satisfied
Adjust ⊘RV300 (C/C delay) in REC mode.
After the adjustment, check adjustment procedure 1 to 3 again.

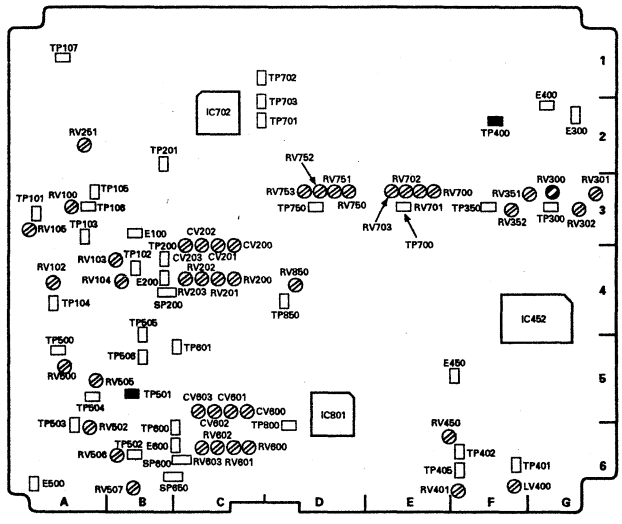
Preparation:
- Input signal: BOWTIE
- Insert a blank tape (BCT-20MA) into the unit.
- REC mode

Connection : CONNECTION 2
Test point: TP501/VO-46 Board
Trigger: TP400/VO-46 Board
Adjusting point: ⊘ RV300/VO-46 Board
Specification: A = 0 ± 5 ns

Oscilloscope



VO-46 BOARD -A SIDE-



SECTION 12
ELECTRICAL ALIGNMENT WITH REPLACEMENT OF MECHANICAL PARTS

12-1. ELECTRICAL ALIGNMENT AFTER UPPER DRUM ASSY OR DRUM ASSY REPLACEMENT

- 11-8. Y RF Recording Current System Adjustment
- 11-17. C RF Recording Current System Adjustment
- 11-18. Y RF Level Adjustment
- 11-19. C RF Level Adjustment
- 11-20. RF Alarm Adjustment
- 11-21. Overall Y Recording Frequency Response Check
- 11-22. Overall C Recording Frequency Response Check
- 11-23. Recording Y/C Delay Adjustment
- 11-24. Recording C/C Delay Adjustment

12-2. ELECTRICAL ALIGNMENT AFTER AUDIO HEAD REPLACEMENT

- 10-1. Audio Level Volume Reference Position Adjustment
- 10-4. Playback Frequency Response Adjustment
- 10-5. Playback Reference Level Adjustment
- 10-6. Bias Trap Adjustment
- 10-7. Bias Current Adjustment
- 10-8. Overall Recording Level Adjustment
- 10-9. Overall Dolby Frequency Response Adjustment
- 10-10. Overall Channel Phase Adjustment

12-3. ELECTRICAL ALIGNMENT AFTER CAPSTAN REPLACEMENT

- 9-1. Capstan Free Speed Adjustment
- 9-2. Stop Servo Adjustment